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HELIANTHUS ANNUS (SUNFLOWER): THE MAGNIFICENT PLANT- A REVIEW

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ABSTRACT

A popular plant in India is Helianthus annuus, often known as the "Sunflower." It comes from North America natively. The history, biological origin, microscopy, and other elements of a sunflower plant with aesthetic value are covered in the current review. Along with the geographic distribution, harvesting, and culture of Helianthus annuus, it also includes the adulteration and substitution of H. annuus. The medicinal qualities of Helianthus annuus are attributed to a variety of bioactive components, including phenol, terpene compounds, carbohydrates, flavonoids, tannins, alkaloids, saponins, and steroids. Many activities of H. annuus, such as anti-inflammatory, anti-oxidant, anticancer, anti-asthmatic, antigen, antipyretic, astringent, anti-hypoglycaemic effect, antifungal and antibacterial properties, are being investigated pharmacologically. In addition to this, the current research includes comprehensive details about over-the-counter helianthus products as well as home therapies.

KEYWORD: Helianthus Annuus, Sunflower, Adulteration.

INTRODUCTION

The demand for herbal cosmetics is high nowadays due to its ability to act as cosmetics and drugs. Skin care products are important factor to improve the confidence in individuals. Women were thought to be the larger consumer of skin care products but in the present scenario men are equally concern about their look. This concept about the beauty, look and attractiveness leads to the boom in this field. The cosmeceutical companies produce their product based on the skin texture like men require special type of products due to the roughness of their skin than women.[1]

Sunflower is the most popular oilseed crop in Europe and North America, where the crop originated and was domesticated during the first millennium B.C. While the Native Americans used many different plant parts of wild sunflowers as medicines and culinary, the crop was first spread across the world as ornamental. Sunflower became a vital oilseed crop globally after the Russians bred the Mammoth Russian, increasing the side of the heads and the seed oil content from 28% to almost 50% in 1860.[2]

Biological Source

Helianthus is a genus comprising about 70 species of annual and perennial flowering plants in the daisy family Asteraceae commonly known as Sunflowers. Except for three South American species, the species of Helianthus are native to North America and Central America. The best-known species is the common sunflower (Helianthus annuus). This and other species, are cultivated in temperate regions and some tropical regions, as food crops for humans, cattle, and poultry, and as ornamental plants. The species H. annuus typically grows during the summer and into early fall, with the peak growth season being mid-summer.[2][3]

Several perennial Helianthus species are grown in gardens, but have a tendency to spread rapidly and can become aggressive. On the other hand, the whorled sunflower, Helianthus verticillate, was listed as an endangered species in 2014 when the U.S. Fish and Wildlife Service issued a final rule protecting it under the Endangered Species Act. The primary threats are industrial forestry and pine plantations in Alabama, Georgia, and Tennessee. They grow to 1.8 metres (6 feet) and are primarily found in woodlands, adjacent to creeks and moist, prairie-like areas.[3]

"Fig 1": The disk of a sunflower is made up of Carolina[2] many of many little flowers.[2]

"Fig 2": In North.

"Fig 3": A sunflower seed growing.[3]

Description

Sunflowers are usually tall annual or perennial plants that in some species can grow to a height of 300 centimetres (120 inches) or more. Each "flower" is actually a disc made up of tiny flowers, to form a larger false flower to better attract pollinators. The plants bear one or more wide, terminal capitula (flower heads made up of many tiny flowers), with bright yellow ray florets (mini flowers inside a flower head) at the outside and yellow or maroon (also known as a brown/red) disc florets inside. Several ornamental cultivars of *H. annuus* have red-coloured ray florets; all of them stem from a single original mutant. While the majority of sunflowers are yellow, there are branching varieties in other colours including, orange, red and purple.

The petiolate leaves are dentate and often sticky. The lower leaves are opposite, ovate, or often heart-shaped. The rough and hairy stem is branched in the upper part in wild plants, but is usually unbranched in domesticated cultivars.[4]

This genus is distinguished technically by the fact that the ray florets (when present) are sterile, and by the presence on the disk flowers of a pappus that is of two awn-like scales that are caducous (that is, easily detached and falling at maturity). Some species also have additional shorter scales in the pappus, and one species lacks a pappus entirely. Another technical feature that distinguishes the genus more reliably, but requires a microscope to see, is the presence of a prominent, multicellular appendage at the apex of the style. Further, the florets of a sunflower are arranged in a natural spiral.

Variability is seen among the perennial species that make up the bulk of those in the genus. Some have most or all of the large leaves in a rosette at the base of the plant and produce a flowering stem that has leaves that are reduced in size. Most of the perennials have disk flowers that are entirely yellow, but a few have disk flowers with reddish lobes. One species, *H. radula*, lacks ray flowers altogether.

Helianthus species are used as food plants by the larvae of many lepidopterans.[5]

Growth stages

- ✓ The growth of a sunflower depends strictly on its genetic makeup and background. Additionally, the season it is planted will have effects on its development; those seasons tend to be in the middle of summer and beginning of fall.
- ✓ Sunflower development is classified by a series of vegetative stages and reproductive stages that can be determined by identifying the heads or main branch of a single head or branched head.[5]

Helianthus

"Fig 4": Common Sunflower (*Helianthus annuus*)[5]

Table-1: Morphological Properties Helianthus annuus.[5]

Scientific Classification

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Asterids
Order	Asterales
Family	Asteraceae

Microscopy of Sunflower

1. Sunflower Seed

a. Seed Coat

- **Structure**: The outer layer is thick and can have various textures, including ridges and grooves.
- **Microscopic Features**: The seed coat consists of multiple layers, including an outer epidermis and a thicker layer of sclerenchyma cells providing protection.

b. Endosperm

- **Structure**: The tissue inside the seed that stores nutrients.
- **Microscopic Features**: Composed of starchy, dense cells that provide nourishment to the developing embryo.

c. Embryo

- **Structure**: Contains the radicle (root precursor), hypocotyl (stem precursor), and cotyledons (seed leaves).
- **Microscopic Features**: The embryo includes a small, complex arrangement of cells that will develop into the seedling. Cotyledons appear as leaf-like structures with distinct vascular tissues.[6]

2. Sunflower Leaf

a. Epidermis

- **Structure**: The outermost layer of cells.
- **Microscopic Features**: Single layer of cells with cuticle covering. Often shows stomata (pores) surrounded by guard cells.

b. Mesophyll

- **Structure**: The middle layer of the leaf, consisting of palisade and spongy mesophyll.
- **Microscopic Features**:
- **Palisade Mesophyll**: Elongated cells rich in chloroplasts, arranged in columns.
- **Spongy Mesophyll**: Irregularly shaped cells with intercellular spaces, allowing gas exchange.

c. Vascular Bundles

- **Structure**: Xylem and phloem tissues arranged in veins.
- **Microscopic Features**: Xylem cells are typically larger with thickened walls, while phloem cells are smaller and involved in nutrient transport.[6]

3. Sunflower Stem

a. Epidermis

- **Structure**: The outer layer of the stem.
- **Microscopic Features**: Single layer of cells, often with a waxy cuticle and possibly some trichomes (hairs).

b. Cortex

- **Structure**: The region between the epidermis and vascular tissue.
- **Microscopic Features**: Contains collenchyma and parenchyma cells, providing support and storage.

c. Vascular Bundles

- **Structure**: Arranged in a ring in dicot stems.
- **Microscopic Features**: Xylem vessels are larger with thick walls; phloem is located outside the xylem. Bundles are surrounded by a bundle sheath.

4. Sunflower Flower Head

a. Ray Florets

- **Structure**: The large, petal-like structures on the outer edge of the flower head.
- **Microscopic Features**: Each ray floret is composed of a single layer of cells with a long, narrow shape, and the surface might have small hairs or glandular cells.

b. Disk Florets

- **Structure**: The small, tubular flowers in the center of the head.
- **Microscopic Features**: Consist of numerous tiny cells with densely packed pollen grains and ovary structures.

c. Bracts

- **Structure**: Leaf-like structures beneath the flower head.
- **Microscopic Features**: Similar to leaf structure but often more specialized with fewer stomata.

5. Sunflower Petals

a. Epidermis

- **Structure**: The outer cell layer.
- **Microscopic Features**: The cells are usually more transparent, with pigments (like carotenoids) giving colour to the petals.

b. Mesophyll

- **Structure**: The tissue between the epidermal layers.
- **Microscopic Features**: Often contains cells with pigments and may include glandular cells that secrete substances.

Microscopy Techniques

- **Light Microscopy**: Used for examining general structures and features of sunflower parts.
- **Scanning Electron Microscopy (SEM)**: Provides detailed surface images of seeds, petals, and other structures, showing textures and fine details.
- **Transmission Electron Microscopy (TEM)**: Offers a detailed view of internal cellular structures, including organelles.[7]

Parts of Plant that has Cosmetic Values

Sunflower plants offer a variety of parts that can be utilized for cosmetic purposes. Here's a breakdown of the different parts and their cosmetic benefits.[8]

- ✓ **Sunflower Oil:** Extracted from the seeds, sunflower oil is widely used in skincare products due to its high content of essential fatty acids, such as linoleic acid, and vitamins E and K. It's known for its moisturizing properties, making it an excellent ingredient in lotions, creams, and hair care products.
- ✓ **Sunflower Seeds:** Beyond the oil, crushed sunflower seeds can be used as an exfoliant in scrubs. They help to gently remove dead skin cells and improve skin texture.
- ✓ **Sunflower Petals:** The petals contain antioxidants and can be used in face masks and skincare treatments. They can also be infused into oils or used in herbal teas that are incorporated into cosmetic formulations.[9]
- **Sunflower Leaf :** The leaves can be used to extract beneficial compounds that may offer anti-inflammatory and soothing properties for skin care. **Sunflower Stems:** Though less common, extracts from sunflower stems can sometimes be found in cosmetic products for their potential antioxidant benefits.

"Fig 5": Helianthus annuus Flower (a) Leaves (b) and seeds (c)[9]

Each part of the sunflower plant can contribute to various cosmetic products, from moisturizers and serums to exfoliants and masks, leveraging the plant's natural properties to benefit skin and hair.[9]

Adulteration and Substitution of Sunflower Plant

Sunflower oil is popular and widely used in both culinary and cosmetic products, but due to its popularity and value, it can sometimes be subject to substitution and adulteration. Here's how these issues typically manifest and what you can do to identify them.[10]

- **Substitution**
- **Blend with Other Oil:** Sunflower oil might be blended with cheaper oils like soybean oil, canola oil, or palm oil to reduce costs. This can affect the oil's properties and quality.
- **Lower-Quality Sunflower Oil:** Sometimes, lower grades of sunflower oil may be used instead of high-quality, refined sunflower oil. This can impact the oil's effectiveness and stability.

Adulteration

- Addition of Synthetic Compounds : Some sunflower oils might be adulterated with synthetic compounds or chemicals to mimic the appearance or properties of pure sunflower oil.
- Use of Rancid Oil: Older or improperly stored sunflower oil can become rancid. Sometimes, rancid oil might be deodorized or chemically treated and sold as fresh.[10]

Identifying Substitution and Adulteration

- **Check the Label**: Look for terms like "100% sunflower oil" and check for any added ingredients or blending with other oils. High-quality products often have detailed ingredient lists and certifications.
- **Conduct a Sensory Test:** Pure sunflower oil typically has a light, neutral smell. If the oil has an off or strong Odor, it might be adulterated or rancid.

- **Perform a Simple Test:** You can perform tests like the iodine value test or saponification value test to determine the oil's purity. These tests, however, are more complex and usually require a lab.
- **Buy from Reputable Sources:** Purchase sunflower oil from well-known and trusted brands or suppliers who provide transparency about their sourcing and processing practices.
- **Look for Certifications:** Certifications like organic or non-GMO can sometimes help ensure the oil is pure and not adulterated.

By being aware of these potential issues and taking steps to verify the purity of sunflower oil, you can ensure that you're getting a high-quality product that meets your needs.[11]

Allied Species of Sunflower

Sunflowers belong to the genus *Helianthus*, which includes several species beyond the common sunflower (*Helianthus annuus*). Some of these allied species have similar characteristics or uses. Here's a list of notable species within the *Helianthus* genus.[12]

1. Helianthus tuberoses (Jerusalem Artichoke)

Description: Often grown for its edible tubers, which are used in cooking and can be a source of inulin, a type of fiber.

Uses: The tubers are consumed as vegetables, and the plant can also be used in landscaping.

2. Helianthus maximiliani (Maximilian Sunflower)

Description: A perennial species known for its tall stature and numerous, small yellow flowers.

Uses: Primarily used for ornamental purposes and can attract pollinators.

3. Helianthus angustifolius (Swamp Sunflower)

Description: This species has narrow leaves and produces bright yellow flowers.

Uses: Often used in wetland and native plant gardens due to its tolerance of wet conditions.

4. Helianthus debilis (Beach Sunflower)

Description: A low-growing, spreading plant with bright yellow flowers.

Uses: Commonly used in coastal and drought-tolerant landscaping due to its adaptability.

5. Helianthus giganteus (Giant Sunflower)

Description: Known for its large size and tall growth, producing large yellow flowers.

Uses: Ornamental, often used in wildflower gardens and for creating dramatic visual effects in landscapes.

These allied species of sunflowers can vary greatly in terms of size, habitat preferences, and uses, ranging from ornamental purposes to practical applications like food production. Each species brings unique characteristics to gardening and landscape design.

The sunflower (*Helianthus annuus*) has a wide geographic distribution, primarily due to its adaptability and the various uses that people have found for it. Here's an overview of the geographic distribution of sunflowers.[12]

Geographic Distribution of *Helianthus Annuus*

Native Range

- **North America:** Sunflowers are native to North America, particularly the central and eastern regions. They were cultivated by Native Americans long before European settlers arrived. The plant is indigenous to the regions that now include parts of the United States, Mexico, and Canada.[13]

Global Cultivated Regions

- **United States:** Sunflowers are widely grown across the U.S., especially in states like North Dakota, South Dakota, Nebraska, and Kansas. These areas are known for their large-scale sunflower farming, primarily for oil production and seeds.
- **Canada:** In Canada, sunflowers are cultivated in the Prairie Provinces (Manitoba, Saskatchewan, and Alberta) where the climate is suitable for their growth.
- **Mexico:** Sunflowers are also grown in various parts of Mexico, benefiting from the favourable growing conditions.[14]

International Distribution

- ✓ **Europe:** Sunflowers are widely cultivated across Europe. Major producers include Russia, Ukraine, Romania, and France. The plant thrives in the temperate climates of these regions.
- ✓ **South America:** In South America, Argentina and Brazil are significant producers of sunflowers. The crop is grown both for oil production and as bird feed.
- ✓ **Asia:** Sunflowers are grown in various countries across Asia. In Russia, which is one of the largest producers of sunflower oil, the plant is cultivated extensively. Other countries, like China and India, also grow sunflowers, although not as extensively as Russia.
- ✓ **Africa:** In Africa, sunflower cultivation is growing, especially in countries like South Africa and Ethiopia. The plant is used both for oil production and as a food source.[15]

Adaptability

Sunflowers are adaptable to various climates and soil types, which contributes to their broad geographic distribution. They grow well in temperate regions but can also be cultivated in subtropical and tropical areas, provided they have adequate water and sunlight.

Agricultural and Ornamental Uses

- ✓ **Agricultural Uses:** In addition to oil production,

sunflowers are grown for their seeds, which are used as snacks, in bird feed, and as ingredients in various foods.

- ✓ **Ornamental Uses:** Sunflowers are also popular in gardens and landscaping for their bright, cheerful blooms.

The widespread cultivation of sunflowers around the world reflects their importance in agriculture, horticulture, and industry.

The sunflower (*Helianthus annuus*) is a highly versatile plant with a broad geographic distribution, varied collection practices, and specific cultivation methods.[16]

Collection and Cultivation of Sunflower Plant

Wild Collection

- ✓ Traditional Practices: In the native regions, sunflowers were traditionally collected by indigenous peoples for their seeds, which were used for food and ceremonial purposes.
- ✓ Research and Conservation: Wild sunflower varieties are collected for research purposes to study genetic diversity, disease resistance, and adaptation traits.

Commercial Collection

- ✓ **Seed Harvesting:** Commercially, sunflowers are harvested for their seeds, which are used for oil extraction, as food, or for bird feed.
- ✓ **Research Collections**: Seeds from different sunflower varieties are collected and stored in gene banks for conservation and research.[17]

Cultivation

Soil and Climate Requirements

- ✓ **Soil:** Sunflowers prefer well-drained, loamy soil but can adapt to a range of soil types. They require a pH between 6.0 and 7.5.
- ✓ Climate: They thrive in full sun with plenty of direct sunlight. Sunflowers are grown in temperate and warm climates and can tolerate drought but need regular watering for optimal growth.[18]

Planting

- ✓ **Timing:** Sunflowers are typically planted in spring after the last frost. They grow best in temperatures between 70°F and 78°F (21°C to 26°C).
- ✓ **Spacing:** Plant seeds 1 to 1.5 inches deep, with spacing of 6-12 inches apart within rows and 24-36 inches between rows, depending on the variety.[19]

Care

- ✓ **Watering:** Regular watering is essential, especially during dry spells. However, overwatering can lead to root rot.
- ✓ **Fertilization:** Sunflowers benefit from a balanced fertilizer or one with higher phosphorus and potassium. Fertilize at planting and again as the plants begin to flower.
- ✓ **Pest and Disease Control:** Common pests include aphids, beetles, and sunflower moths. Diseases like downy mildew and rust can affect sunflowers. Integrated pest management (IPM) and crop rotation can help manage these issues.[20]

Environmental and Economic Impact

- ✓ **Crop Rotation:** Sunflowers are often used in crop rotation to improve soil health and reduce the prevalence of soil-borne diseases.
- ✓ **Economic Importance:** Sunflowers contribute significantly to the agricultural economy, providing oil, food products, and other industrial uses.

Overall, sunflowers are cultivated globally with various practices tailored to local conditions, making them a versatile and valuable crop.[20]

Pharmacological Activities of *Helianthus Annuus*

There are different types of pharmacological activities which are represented in "Fig.6"[21]

- ✓ **Anti-inflammatory**

Activities Sunflower exhibits anti-inflammatory activity. From an n-Butanol-soluble fraction of a methanol extract of a flower petal of sunflower, two new oleanane-type triterpene glycosides, helianthosides along with four known triterpene glycosides, helianthosides isolated which possess distinct anti-inflammatory activities on 12-O -tetradecanoylphorbol- 13-acetate induced ear edema in mice. All of the triterpene glycosides exhibit potent inhibitory effects and are more potently inhibit.[21]

- ✓ **Anti-asthmatic Activity**

The effect of H. annuus L. seed aqueous extract is analyzed on an in vivo anti-asthmatic model on ovalbumin induced mice and their lungs are assessed by hematoxylin and eosin staining. By these findings it is conclude that the extract has extensive potential to reduce the asthma.

- ✓ **Antioxidant property**

Sunflower plant has excellent anti-oxidant property. The antioxidant capability of the sunflower seed extracts is obtained by chronological extraction with different polarities of solvents by in vitro methods: ferric reducing/antioxidant power, oxygen radical absorbance

capacity assays and 2- diphenyl-1-picrylhydrazyl radical. It is analyzed that the intake of this seed may prevent cancer and other oxidative reaction related diseases.[21]

✓ **Antigen property**

Different extracts from H. annuus exhibit inhibitory effect on Epstein-Barr virus. It is analyzed that from the diethyl ether extract of the pollen grains of H. annuus following compounds are isolated such as four free triterpene alcohols, eight fatty acid esters of triterpene alcohols, two tocopherol-related compounds, four estolides, three syn-alkane4, 6- diols, 1, 3-dioxoalkanoic acid and one aliphatic ketone along the mixture of free fatty acids and showed inhibitory effects on Epstein-Barr virus and early antigen induced by tumor promoter induction.[21]

✓ **Anti- hypoglycemic effects**

Ethanolic extracts of H. annuus exhibit antidiabetic potential. Seeds show antihyperglycemic effect in rats. It is detected that the oral administrations of ethanolic extract which contain polyphenols from H. annuus L. cause a decline in diabetes.[21]

✓ **Antimicrobial activities**

The antimicrobial activity of methanolic extract of seeds is evaluated from Helianthus annuus. The polar oil from the seeds of sunflower (Helianthus annuus) shows antimicrobial activity against Staphylococcus epidermis, E. coli, Pseudomonas aeruginosa, Candida albicans, Staphylococcus aureus and Proteus vulgaris. H. annuus show better antifungal properties. Methanol extracts of H. annuus seed posse's antifungal activity against fungal strains which cause various infections.[21]

Phytoconstituents of *Helianthus Annuus*

Table-2: Phytoconstituents found in Helianthus annuus.[22]

Name of compounds	Plant part
Carbohydrates	Seeds
Phenolic compound	Florets
Allelochemicals	Leaves, Stems, Roots
Saponin	Seeds
Tannins	Seeds
Terpenoids	Aerial parts
Steroids	Seeds
Flavonoids	Seeds

The important Phytoconstituents derived from H. annuus are flavonoids, flavonoids, carbohydrates, tannins, saponins, alkaloids, phytosterols, active proteins and fixed oils.[11] The composition of the seed of sunflower is as proteins, peptides, amino acids and other non-protein nitrogen, carbohydrates, lipids, fatty acids, palmitic acid, oleic acid, linoleic acid, tocopherol, carotenoids, vitamin, chlorogenic acid, quinic acid, caffeic acid, total minerals potassium, Sulphur, phosphorus, calcium, magnesium and sodium.

✓ **Carbohydrate**

Polysaccharides which are non-starch obtained from sunflower (H. annuus L.) extracts by delignification of the related cell wall materials which were sub fractionated by graded ethanol precipitation, adsorption chromatography and size exclusion and by chronological alkaline extraction.[22]

The methanolic seeds extract of H. annuus L. show that the plant contains significant amount of carbohydrates.

✓ **Phenols**

Phenols are isolated from H. annuus Florets of sunflower are rich source of dietary fiber, Fe and phenols.

✓ **Allelochemicals**

Allelochemicals are analyzed in leaves, roots and stems of sunflower by using thin layer chromatography for alkaloids and spectrophotometry for flavonoids and phenols.

✓ **Saponins**

Triterpenoid Saponins: These compounds may have immune-boosting and anti-inflammatory properties.

✓ **Tannins**

Tannins are reported in H. annuus and it is analyzed that contain an oleic acid, alkaloid, tannins, fixed oils and simple phenolic compound.

✓ **Terpene compounds**

From the aerial parts of H. annuus an entkaurane glycoside named helikauranoside A are analyze along three known compounds which are grandifloriacid, paniculoside and ent-kaurane-type diterpenoids: (-) kaur-16-en-19-oic acid.[17] Anew germacranolide with a methylene-y-lactone moiety, the heliangolideniveusin B and its ethoxyderivative are isolated by ethanolic extract and their structures elucidated by spectroscopic methods and two sesquiterpene are derived from the leaves and stem.

✓ **Flavonoids**

Types of Flavonoids in Sunflowers

- ✓ **Quercetin:** A common flavonoid with antioxidant and anti-inflammatory properties. It can help neutralize free radicals and reduce inflammation.
- ✓ **Kaempferol:** Another flavonoid with antioxidant properties that may contribute to cardiovascular health and have anti-cancer effects.
- ✓ **Luteolin:** Known for its antioxidant and anti-inflammatory effects, luteolin is also being studied for its potential neuroprotective benefits.

These phytoconstituents make sunflowers a valuable plant not only for their nutritional benefits but also for their potential therapeutic applications.[22]

Cosmetic Use of *Helianthus Annuus*

Sunflower (Helianthus annuus) plants offer a range of

cosmetic benefits, primarily due to their various components like oil, seeds, and petals. Here's a comprehensive look at how different parts of the sunflower plant is utilized in cosmetics.[23]

- **Hydration:** Sunflower oil and seeds help retain moisture and keep the skin hydrated.
- **Antioxidant Protection:** Vitamin E and other antioxidants help protect the skin from damage caused by free radicals.
- **Nourishment:** Essential fatty acids and vitamins in sunflower oil and seeds nourish the skin and hair.
- **Soothing:** Extracts from petals and leaves can soothe and calm irritated skin.[23]

1. Sunflower Oil

✓ **Moisturizer**

Uses: Sunflower oil is commonly used in lotions, creams, and body butters for its excellent moisturizing properties. It is rich in linoleic acid, which helps to maintain the skin's barrier and retain moisture.

✓ **Anti-Aging**

Uses: The high content of Vitamin E in sunflower oil acts as an antioxidant, protecting the skin from oxidative damage and reducing the appearance of fine lines and wrinkles.

✓ **Cleanser**

Uses: Sunflower oil can be used as a gentle makeup remover or facial cleanser. It helps to dissolve impurities and makeup without stripping the skin of its natural oils.

✓ **Hair Care**

Uses: Applied to the hair, sunflower oil can condition and add shine. It helps to nourish the scalp and can be used in hair masks to improve overall hair health.

✓ **Anti-Inflammatory Effects**

The anti-inflammatory properties of sunflower oil make it suitable for soothing irritated and inflamed skin. It may aid in curing conditions such as eczema and dermatitis.

✓ **Anti-Ageing Actions**

Packed with a high concentration of vitamin E, sunflower oil promotes collagen production**,** reducing the appearance of fine lines and wrinkles. This supports to a make your skin look youthful and attain a radiant complexion.

✓ **Acne Prevention**

Contrary to common belief, sunflower oil is non-comedogenic and won't clog pores. The light texture of this natural emollient makes it ideal for all skin types, even those prone to acne. Regular use may help prevent breakouts and make the skin flawless.

Uses of Sunflower Oil for Skin

✓ **Facial Moisturizer**

Smear a few drops of sunflower oil to your face as a part of your daily skincare routine to lock in moisture and promote a healthy glow.

✓ **Makeup Remover**

Sunflower oil can effectively dissolve makeup without harsh chemicals. Gently massage it onto your face and wipe it away with a cotton pad for a natural and nourishing makeup-removal process.

2. Sunflower Seeds

✓ **Exfoliant**

Uses: Ground or crushed sunflower seeds are used in facial scrubs and body exfoliants. They provide a gentle abrasive action to help remove dead skin cells and improve skin texture.

Hair Treatment

Uses: Sunflower seeds are rich in essential fatty acids and minerals, which can be beneficial when ground into a paste and used as a hair treatment to strengthen and nourish the hair.

3. Sunflower Petals

✓ **Infused Oils**

Uses: Sunflower petals can be infused into carrier oils to create a floral-scented oil that can be used in massage oils, bath oils, or as a base for other cosmetic products.

✓ **Face Masks**

Uses: Extracts or infusions of sunflower petals can be incorporated into face masks for their antioxidant and anti- inflammatory properties. They help soothe the skin and improve its appearance.

4. Sunflower Leaf Extract

✓ **Soothing Agent**

Uses: Sunflower leaf extracts can be used in skincare products for their potential anti-inflammatory and soothing properties, which help calm irritated or sensitive skin.

5. Sunflower Stems

✓ **Extracts**

Uses: Although less common, extracts from sunflower stems may be used in some cosmetic formulations for their antioxidant properties. They can help protect the skin from environmental stressors.[23]

Adverse Effects of *Helianthus Annuus*

Sunflower oil is commonly used in cosmetics for its moisturizing and emollient properties, but there are a few potential adverse effects to consider.

1. Allergic Reactions: Some people may develop allergies to sunflower oil or other ingredients in cosmetic products. Symptoms can include redness, itching, swelling, or rash. If you have sensitive skin or known allergies, it's wise to perform a patch test before using a new product.[24]

2. Acne or Breakouts: For individuals with acne-prone or oily skin, sunflower oil might exacerbate the condition due to its comedogenic properties (though it's generally considered non-comedogenic). If you notice an increase in breakouts after using a product containing sunflower oil, it may not be suitable for your skin type.

3. Skin Irritation: In rare cases, sunflower oil might cause skin irritation or a reaction in those with very sensitive skin. Symptoms could include redness, stinging, or burning sensations.[25]

4. Photosensitivity: While sunflower oil is not typically known to increase photosensitivity, combining it with other ingredients or products that make skin more sensitive to sunlight could potentially increase the risk of sunburn or irritation.

5. Quality and Contaminants: The quality of sunflower oil can vary, and some products might contain impurities or contaminants. Using low-quality or improperly stored oil in cosmetics could potentially lead to adverse skin reactions.

6. Interactions with Other Ingredients: Sunflower oil might interact with other active ingredients in cosmetic products, potentially altering their effectiveness or leading to unexpected skin reactions.[26]

If you're trying a newproduct containing sunflower oil or anyother ingredient, it's a good idea to check the ingredient list for potential allergens and start with a patch test to ensure it doesn't cause any adverse reactions.

Marketed Formulations of *Helianthus Annuus*

Table 3: Marketed Formulations of Helianthus Annuus.

Sr.n o	Marketed formulation	Brand name	Company name	Dose	Price (Rupees)
1.	Sunflower oil (Face oil)	Stasthous	Stasthous Essential	1-2 drops	314[27]
2.	Vitamin e oil (Facial oil)	Khadi	Khadi Organique	1-2 drops	399[28]
3.	Replenishing oil	The Juice beauty	The Juice beauty	2-3 drops	8500[28]
4.	Sunflower serum (Face serum)	SCT Unlimited	SCT Unlimited	1-2 drops	800[29]
5.	Sunflower beauty oil (face and body oil)	Khaytels	Khaytels	1-2 drops	180[30]
6.	Sunflower lotion	SCT Unlimited	SCT Unlimited	1-2 drops	800[31]
7.	Sun serum (Sunscreen)	Sun serum	Miss Sunflower	Pump out the desired amount of sunscreen gel onto your fingertips	1200[32]
8.	Sunflower (Face Sheet Mask)	Hello Glow	Hello Glow	Use direct on Face	150[33]
9.	Bio Sunflower matte gel (Sunscreen)	Boutique	Boutique	Use direct on Face	295[34]
10.	Lotion	Alizaba Cares	Alizaba Cares	Use direct on Face	499[35]
11.	Sun guard gel	Mitvana	Mitvana	Use direct on Face	352[36]
12.	Hydrating day cream	Coal	Coal	Use direct on Face	760[37]
13.	Moisturizing Lotion	Moha	Moha	Use direct on Skin	173[38]
14.	Moisture Sunscreen	Rovectin	Rovectin	Use direct on Face	1980[39]
15.	Sunflower Oil (Face and Body)	Just Peachy	Just Peachy	Use direct on Face and Skin	300[40]
16.	Hand Cream	Sunflower	Sunflower	Use direct on Skin	800[41]
17.	Face wash	Disaar beauty skincare	Disaar beauty skincare	Use direct on Face	1200[42]
18.	Sunflower seed oil (face)	Seed	Seed	1-2 drops	2000[43]
19.	Facial Cleanser	Earth Secret	Earth Secret	Use direct on Face	999[44]
20.	Facial Scrub	Solros- Tval	Solros- Tval	Use direct on Face	699[45]
21.	De-tan cream	Ningen	Ningen	Use direct on Face	599[46]
22.	Face Cream	Aravia	Aravia	Use direct on Face	399[47]
23.	Face Toner	Megan	Megan	Use direct on Face	299[48]
24.	Sunflower body cream	Plant Therapy	Plant Therapy	Use direct on Skin	500[49]
25.	Bleach soap	Sunflower	Sunflower	Use direct on Face	499[50]

Home Made Remedies of *Helianthus Annuus*

1. Sunflower Oil Moisturizer Ingredients

- 2 tablespoons of sunflower oil
- 1 tablespoon of coconut oil (optional, for added moisture)
- A few drops of essential oil (like lavender or tea tree,

optional)

Instructions
1. Mix sunflower oil with coconut oil (if using) in a clean container.
2. Add a few drops of essential oil if desired.
3. Apply a small amount to your face or body and massage gently.

Benefits: Sunflower oil is rich in fatty acids and vitamin E, which help moisturize and protect the skin.[51]

2. Sunflower Seed Face Scrub Ingredients
- 2 tablespoons of finely ground sunflower seeds
- 1 tablespoon of honey
- 1 tablespoon of yogurt

Instructions
1. Mix the ground sunflower seeds with honey and yogurt to form a paste.
2. Gently massage the paste onto your face in circular motions.
3. Rinse off with warm water.

Benefits: The sunflower seeds provide gentle exfoliation, while honey and yogurt offer moisturizing and soothing properties.

3. Sunflower Oil Hair Mask Ingredients
- 3 tablespoons of sunflower oil
- 1 tablespoon of honey
- 1 tablespoon of aloe vera gel

Instructions
1. Combine sunflower oil, honey, and aloe vera gel in a bowl.
2. Apply the mixture to your hair, focusing on the ends.
3. Leave it on for 30 minutes to an hour, then wash out with shampoo and conditioner.

Benefits: This hair mask helps to nourish and hydrate the hair, making it softer and shinier.[51]

4. Sunflower Seed Facial Toner Ingredients
- 1 cup of water
- 1 tablespoon of sunflower seed oil
- 1 teaspoon of witch hazel (optional)

Instructions
1. Heat the water and infuse it with sunflower seeds by simmering for about 10 minutes. Strain out the seeds and let the water cool.
2. Mix in sunflower seed oil and witch hazel if using.
3. Apply the mixture to your face using a cotton pad after cleansing.

Benefits: This toner helps to refresh and balance the skin while providing a light layer of moisture.

5. Sunflower Oil Lip Balm

Ingredients
- 2 tablespoons of sunflower oil
- 1 tablespoon of beeswax
- 1 tablespoon of shea butter
- A few drops of your favourite essential oil (optional)

Instructions
1. Melt the beeswax and shea butter together in a double boiler.
2. Stir in the sunflower oil and essential oil if using.
3. Pour the mixture into lip balm containers and let it cool. Benefits: Provides hydration and protection for the lips.

6. Sunflower Seed Eye Treatment

Ingredients
- 1 tablespoon of sunflower seed oil
- 1 tablespoon of aloe vera gel

Instructions
1. Mix the sunflower seed oil and aloe vera gel.
2. Gently apply under your eyes, avoiding direct contact with the eyes.
3. Leave it on for 10-15 minutes, then gently wipe off with a damp cloth.

Benefits: This mixture can help reduce dryness and soothe the delicate skin around the eyes.

Tips for Homemade Remedies
- ✓ Patch Test: Always perform a patch test before using any homemade remedy to ensure you don't have an adverse reaction.
- ✓ Storage: Store homemade products in clean, airtight containers and use them within a reasonable time frame to ensure freshness and effectiveness.

These remedies utilize the nourishing properties of sunflower oil and seeds to offer simple, natural solutions for skincare and hair care.[51]

CONCLUSION

The present review will helpful for providing fundamental information about history, biological source and microscopy of *helianthus annuus*. It also involves cosmetic values of sunflower plant for the treatment of acne and pigmentation skin along with their pharmacological activities. The article also incorporates significant therapeutic effects seen by H. annuus are a result of the presence of an array of phytoconstituents which include terpene compounds, carbohydrates, phenols, flavonoids, tannins, alkaloids, saponins, phytosterols. Finally, it is concluded that the review article will provide brief overview of which contains key information of adverse effects and cosmetic uses of sunflower plant.

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