Sunflower

**BOTANY**

*Helianthus annuus* L. Common name, sunflower. This annual plant is a member of the Asteraceae family. It is an erect, unbranched plant, growing up to 0.6-3m. The stem is semi-woody, solid, covered by a scarbid garment. Leaves are alternate, large, three-nerved, acuminate, toothed, with rough hairs on the upper- and the lower-surfaces and long petioles; their color varies from dark-green to yellowish-green, depending on the cultivation conditions and the variety. A plant usually bears 12-40 leaves. Flowers are clustered in solitary capitula, which have the ability to rotate. The capitula are large, flamboyant, 10-30 cm in diameter. Floral receptacle is flat of semi-flat. Each capitulum includes two types of flowers: the inner and the outer flowers. The inner flowers are tubular, brown and hermaphrodite; these flowers produce the fruits. The outer flowers are ligulate, yellow and sterile; these flowers attract pollinator insects. Flowering occurs from July to September. The fruit, commonly known as sunflower seed, is an achene 3-20 mm long and 2-13 mm wide.

At present, only a few countries cultivate substantial amounts of sunflower: the whole of the European Union, Central and Eastern Europe, the United States and Argentina. Smaller amounts are also cultivated in China, Turkey, India and South Africa.

Sunflower extract is produced from the petals of *Helianthus annuus* L. flowers.

**CHEMISTRY**

**Flavonoids**

*Lato sensu* flavonoids are pigments almost universally present in plants. They are almost always water-soluble. These pigments give their color to flowers and fruits, sometimes also to leaves (Bruneton J, 2001).

Quercetin and its glycosides are among the most important flavonoids in sunflower (http://www.ars-grin.gov/cgi-bin/duke/farmacy2.pl).
Essential oil
Sunflower essential oil is rich in terpenoids, mainly sesquiterpene lactones and monoterpenes (www.ars-grin.gov/cgi-bin/duke/farmacy2.pl).

Other active principles
Fructose, galactose, pectin, hemicellulose, maltose, succrose.

TRADITIONAL USES
Sunflower is native to America, where it has been cultivated since year 1000 B.C. Francisco Pizarro found it in Tahuantisuyo (Peru), where the natives used to worship a sunflower image, as a symbol for their god the Sun. The Spaniards carried this plant to Europe, at the beginnings of century XVI. Cherokee indians used to prepare sunflower leaves infusion to treat kidney disorders. Zuni indians used the flowers to prepare yellow dye. In traditional European medicine, sunflower infusion was used as an insecticide against flies.

COSMETIC PROPERTIES

Photo-protective activity
This activity is mainly due to the flavonoid content of sunflower petals. Flavonoids are antioxidant active principles.

The chemical criteria to establish the antioxidant capacity of flavonoids are:

- Presence of an O-hydroxyl structure in the B ring, which confers higher stability to the radical form and participates in electron delocalization.
- A double bond, in conjugation with the 4-oxo functional group in the C ring
- 3- and 5-OH groups with 4-oxo function in the A and C rings necessary to reach the maximum antioxidant power

The antioxidant activity of flavonoids results from the combination of their iron chelating activity and their ability to scavenge ageing-inducing free radicals (FR). Flavonoids can inhibit oxidases such as lipooxygenase (LO), cyclooxygenase (CO), mieloperoxidase (MPO), NADPH oxidase and xanthise oxidase (XO), thus preventing the in vivo formation of reactive oxygen species (ROS) and organic hydroperoxide. Additionally, it has been found that flavonoids inhibit enzymes indirectly involved in oxidative processes, such as phospholipase A2 (PLA2) and stimulate other enzymes with well-known antioxidant properties, such as catalase (CAT) and superoxide dismutase (SOD). (Pérez Trueba G., 2003).

Besides scavenging free radicals, chelating metal ions and inhibiting oxidase enzymes, flavonoids may increase the availability of endogenous antioxidants and the activity of antioxidant enzymes. Additionally, they inhibit enzymes involved in the formation of ROS (Pérez Trueba G., 2003).

Therefore, sunflower extract is recommendable to formulate aimed at the protection of skin and hair integrity against oxidative processes.
**Anti-inflammatory activity**
During the study of photochemical and pharmacological active principles in Asteraceae species, Ukiya M et al (2007) observed marked anti-inflammatory activity for methanol extracts of *Helianthus annuus* petals on 12-O-tetradecanoylphorbol-13-acetate (TPA)-induced mice ear edema. These extracts were found to contain triterpene glycosides.

Therefore, sunflower extract is of great use to formulate cosmetic products with anti-irritant activity.

**Antimicrobial activity**
All of the essential oils have antimicrobial activity to a greater or lesser degree. This activity can be measured by using the phenol coefficient, which rates the antimicrobial strength or weakness of a certain oil comparing it with that of pure phenol (coefficient = 1.0). Phenol – a component of essential oils – shares some characteristics of alcohol, which result in antimicrobial activity. The highest the phenol coefficient of a certain essential oil, the strongest its antimicrobial activity. Different research studies have confirmed the antimicrobial properties of essential oils, especially on antibiotic-resistant bacteria, such as methicillin-resistant *Staphylococcus aureus* or vancomycin-resistant *Enterococcus faecium*. The antimicrobial activity of essential oils is attributed to their main chemical components: citral (aldehyde), geraniol (primary alcohol), eugenol (phenol), menthol (secondary alcohol) and cinnamic aldehyde (aldehyde) (Hartman D. & Coetzee JC., 2002).

Essential oils show antiseptic effects against different pathogenic bacteria, even antibiotic-resistant strains. Some essential oils are also effective against the fungi and yeasts (*Candida*) that cause mycosis. The active doses are generally low. In general, the doses calculated for *in vitro* experiments may be used for external applications. Compounds such as linalool, citral, geraniol, or thymol are more antiseptic than phenol by 5, 5.2, 7.1 and 20 times respectively (Bruneton J., 2001).

A number of studies support the antimicrobial properties of plant essential oils. These studies evidence the potential of these actives in the fields of cosmetic, medical and food-industry (Dorman HJD & Deans SG, 2000).

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**COSMETIC APPLICATIONS**

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**RECOMMENDED DOSE**

The recommended dose is between 0.5% and 5.0%.
BIBLIOGRAPHY


Website:
www.ars-grin.gov/cgi-bin/duke/farmacy2.pl [accessed May 2007].