

## Hazelnut Oil



### BOTANY

*Corylus avellana* L. Family Betulaceae (Corylaceae). It is commonly known as *hazel*. It is typically a shrub reaching 3-8 m tall, but can reach 15 m on occasion. The leaves are deciduous, rounded, 6-12 cm long and across, softly hairy on both surfaces, and with a double-serrate margin. The flowers are produced very early in spring before the leaves, and are monoecious, with single-sex catkins, the male pale yellow and 5-12 cm long, the female very small and largely concealed in the buds, with only the bright red 1-3 mm long styles visible. The fruit, known as *hazelnut*, is a nut produced in clusters of one to five together, each nut held in a short leafy involucre ("husk") which encloses about three quarters of the nut. The nut is roughly spherical to oval, 12-25 mm long and 12-20 mm broad, yellow-brown with a pale scar at the base. The nut falls out of the involucre when ripe, about 7-8 months after pollination.

The hazelnut oil is a pressing obtained from the seeds of *Corylus avellana*.

### CHEMISTRY

Hazelnut is a well esteemed fruit containing a high oil proportion, approximately 61%, in its chemical composition. Minerals (potassium, phosphorus, calcium and magnesium), amino acids (glutamic acid, arginine, aspartic acid), sugars and organic acids (malic acid) are also present. The presence of vitamins, especially vitamin E is also remarkable (Alasalvar, C., 2003).

Table 1 shows hazelnut nutritional composition.

Proteins (g)	13.0
Carbohydrates (g)	9.6
Fibre (g)	7.5
Total fat content (g)	62.0
Fatty acids	
Saturates (g)	4.6
Unsaturates	
Monounsaturates (g)	48.7
Polyunsaturates (g)	5.8
Vitamin E (mg)	15.19
Phytosterols (mg)	96.0

Table 1. Hazelnut nutritional composition. Values in % of weight (g/100g of foodstuff). ([www.nucis.org/avellanes\\_eng.htm](http://www.nucis.org/avellanes_eng.htm))

## Lipids

Table 2 shows the fatty acids composition of hazelnut oil.

<b>Fatty acids</b>	<b>Content (%)</b>
Palmitic acid (C16:0)	4.0 - 7.0
Palmitoleic acid (C16:1)	Max. 0.4
Stearic acid (C18:0)	1.0 - 4.0
Oleic acid (C18:1)	70.0 - 90.0
Linoleic acid (C18:2)	7.0 - 15.0
Linolenic acid (C18:3)	Max. 0.5
Gadoleic acid (C20:1)	Max. 0.2

Table 2. Hazelnut oil fatty acids composition.

Among the fatty acids, there is a remarkably high oleic acid proportion, which can reach 90% (Table 2). Linoleic acid, palmitic acid, stearic acid and a total of 16 fatty acids have been identified.

Table 3 shows the composition of the non-saponifiable fraction of hazelnut oil.

<b>Composition of the non-saponifiable fraction (mg/100 g oil)</b>	
Squalene	1 - 30
Tocopherol	25 - 150
Sterol	35 - 150

Table 3. Composition of the non-saponifiable fraction of hazelnut oil.

## TRADITIONAL USES

Hazelnuts are mainly used in the food industry, fresh, roasted, salted or as an ingredient in many elaborated products such as chocolate, nougat, cakes, ice cream and sauces. Hazelnut oil is also used in the food industry. It is mainly used as a source of natural anti-oxidant substances and monounsaturated fatty acids (especially oleic acid), which make it a good ally in cardiovascular risk-reducing diets (Alasalvar, C., 2003).

## COSMETIC PROPERTIES

### Skin barrier repairing activity

Fatty acids deficiency produces skin lesions and deterioration, which result in desquamation, dry skin and reduced skin flexibility and smoothness. Keratinization becomes disorganized, mitosis and DNA synthesis decrease, the skin loses most of its protective functions and perspiration increases. Fatty acids deficiency-related lesions improve after percutaneous applications of fatty acids-rich oils. Therefore, such oils are extensively used in dermatology and cosmetics to treat dry skin and wrinkles and to improve wound healing, through their tissue stimulating and regenerating actions (Holguera, M.C., 1993).

The fatty acids-rich composition and the presence of phospholipids make hazelnut oil a good skin emollient and moisturizing agent. Its good absorption properties give the skin flexibility and elasticity, thus protecting the driest and most sensitive parts of the body (Härtel, B., 1996).

Emollients are mainly lipids and oils, which give the skin improved moisture, smoothness and flexibility. These compounds repair the skin and influence skin permeability, improving the barrier function. Stearic, linoleic, oleic, linolenic and lauric acids are emollient compounds habitually used in cosmetics and dermatopharmacy (Kraft, JN. & Lynde, CW., 2005).

Because of these reasons, hazelnut oil is highly recommendable to formulate cosmetic products with moisturizing and emollient activities.

### Antioxidant activity

Hazelnut oil can delay the oxidation process because of its high vitamin E content (Packer 1993). It is also remarkable that almost 90% of the unsaturated fatty acids are monounsaturated ones, which results in less oil oxidation.

Tocopherols are very efficient antioxidant agents. These active principles protect oils, cell membrane lipids and cell organelles from oxidation;  $\alpha$ -tocopherol (vitamin E) has the strongest biological activity in the organism with very important actions in the skin (Le Poole, H.A.C., 1995).

It has been observed that topical applications of vitamin E result in a high absorption degree. Large amounts of topically applied vitamin E have been found in the horny layer as well as in deeper viable skin layers. This vitamin is also directly absorbed into the hair cortex (Idson, B., 1993).

The antioxidant activity of vitamin E is due to its actual antioxidant action and to its free radical scavenger action:

- antioxidant activity: reduces the formation of lipoperoxides in the skin. The cell membrane is rich in highly unsaturated phospholipids. The oxidation of these phospholipids, due to endogenous as well as exogenous factors, produces lipoperoxides which destabilize the cell membrane and produce skin ageing
- free radical scavenger activity: protects the cells against free radicals, released by the lipoperoxides and involved in skin ageing

Thus, hazelnut oil is highly recommendable to formulate cosmetic products to protect the integrity of skin and hair against the oxidation process.

## COSMETIC APPLICATIONS

Action	Active	Cosmetic Application
Skin barrier repairing	Fatty acids	-Moisturizing -Emollient
Antioxidant	Vitamin E	-Anti-ageing -Photo-protection -Hair colour protection

## RECOMMENDED DOSE

The recommended dose is between 0.5% and 5%.

## BIBLIOGRAFIA

Alasalvar C, Shahidi F, Liyanapathirana C.M, Ohsima T. Turkish Tombul hazelnut (*Corylus avellana L.*). 1. Compositional characteristics. J. Agric. Food Chem. 2003; 51: 3790 - 3796 (ref. 6750).

Alasalvar C. et al. Turkish Tombul hazelnut (*Corylus avellana L.*). Turkish Tombul hazelnut (*Corylus avellana L.*). 2. Lipid characteristics and oxidative stability. J. Agric. Food Chem. 2003; 51: 3797 - 3805 (ref. 6749).

Belitz H.D., Grosch W. Química de los alimentos. 2<sup>a</sup> ed. Zaragoza: Acribia, 1997 (ref. 613 BEL).

Härtel B. Essential fatty acids and eicosanoids in the skin: biosynthesis, biological and cosmetic importance. Härtel B. SÖFW-Journal 1996; 124 (13): 889-900 (ref.25).

Holguera, M.C. Los aceites vegetales. NCP documenta, 1993; 192: 15-18 (ref. 645).

Idson, B. Vitamins and the Skin. Cosmetics & Toiletries, 1993; 108: 79-94 (ref. 1202).

Kraft JN & Lynde CW. Moisturizers: What They are and a Practical Approach to Product Selection. Skin Therapy Letter, 2005; 10 (5): 1-8

Le Poole, H.A.C. Natural oils and fats multifunctional ingredients for skin care. Cosmetics & Toiletries Manufacture Worldwide, 1995; p: 47-56 (ref. 644).

Skolnik P et al. Human essential fatty acid deficiency: treatment by topical application of linoleic acid. Arch Dermatol. 1977; 113 (7):939-41

Trivedi JS, Krill SL, Fort JJ. Vitamin E as a human skin penetration enhancer. European 1995; 3: 241-243 (ref. 6238).

Packer L. Vitamin E cycle and benefits to health. Active Oxygens. Lipid peroxides and antioxidants Boca Raton: CRC Press, 1993 (ref. 3794).

Web sites:

[www.infoagro.com/frutas/frutos\\_secos/avellana.htm](http://www.infoagro.com/frutas/frutos_secos/avellana.htm)

[www.nucis.org/avellanes\\_eng.htm](http://www.nucis.org/avellanes_eng.htm)