

Avocado oil



BOTANY

Persea gratissima Gaertn. (= *Persea americana* Mill.), common name *avocado*. This perennial belongs to the Lauraceae family. It grows 8 to 12m tall; stem erect, bark rough, tree-top dense with abundant branches. Leaves are large, alternate, ovate to elliptical, dark green. Flowers are small, yellowish-white, pedunculate, clustered in axillary bunches. The fruit, called avocado or avocado-pear, is a spherical to pear-shaped drupe with green, yellow or purple skin and rich yellowish pulp, which resembles butter, enclosing a large seed.

Avocado is native to South America. It thrives in deep, fertile, siliceous-clayish soils, between 100 and 2600 m altitude. Avocado is cultivated in Africa, America (Mexico, the United States, Brazil) and Israel.

Avocado oil is obtained from the pressure of the fruits of *Persea gratissima* Gaertn., containing vitamin A, vitamin D and vitamin E.

CHEMISTRY

The avocado is one of the most nutritive among fruits. The pulp has a buttery consistency, looks very much like cow's butter, and has a bland taste with a nutty flavor.

In avocado oil we can find the following active principles:

Lipids

The major fatty acid of avocado is always oleic, followed by palmitic and linoleic acids. The fatty acids present in trace amounts are myristic, stearic, linoleic, and arachidonic (Kadam & Salunkhe, 1995).

Table 1 shows the average fatty acid composition (as a percentage of total fatty acids) of Fuerte and Hass avocados.

Fatty acid	Fuerte		Hass	
	Mature pulp	Seed	Mature pulp	Seed
Saturated				
Myristic	0.05	0.9	0.07	0.7
Palmitic	12.2	19.4	10.7	21.0
Stearic	0.52	0.64	0.25	0.54
Arachidic	0.16	0.21	0.19	0.21
Monounsaturated				
Palmitoleic	4.6	3.7	6.4	3.6
Oleic	72.8	26.2	70.5	29.2
Poluunsaturated				
Linoleic	8.6	41.6	11.4	36.8
Linolenic	0.79	6.4	0.49	7.2
Arachidonic	0.28	0.95	0.0	0.75
Total saturated fatty acids (SFA)	12.93	21.15	11.21	22.45
Total unsaturated fatty acids (UFA)	87.07	78.85	88.79	77.55
UFA/SFA	6.73	3.73	7.92	3.45

Table 1. Average Fatty Acid Composition (as Percentage of Total fatty Acids) of Fuerte and Hass Avocados (Kadam & salunkhe, 1995).

Vitamins

Table 2 shows the vitamin content in avocado.

Vitamin	mg/100 g
A Carotene	0.13 to 0.51
B Thiamine (B ₁)	0.08 to 0.12
Riboflavin (B ₂)	0.21 to 0.23
Pyridoxine (B ₆)	0.45
Niacin (B ₃)	1.45 to 2.16
Pantothenic acid (B ₅)	0.90 to 1.14
Folic acid (B _c)	0.018 to 0.040
Biotin	0.003 to 0.006
C Ascorbic acid	13.0 to 37.0
D Calciferol	0.01
E α-tocopherol	3.0
K 2-methyl-1,4- naphthoquinone	0.008

Table 2. Vitamin content of avocado – fresh weight (Batista, A. et al., 1993).

Avocado oil has vitamin A, E and D (Batista, A. et al, 1993).

Minerals

Avocado contains larger mineral proportion than other fruits. Main minerals in avocado are: potassium, manganese, phosphorus and silicon.

Table 3 shows the minerals content in two avocado varieties.

Minerals	Fuerte	Hass	Minerals	Fuerte	Haas
Potassium	555	723	Magnesium	0.34	0.360
Manganese	41	64	Aluminum	0.32	0.28
Phosphorus	30	42	Copper	0.23	0.26
Silicon	21	31	Chromium	0.062	0.016
Calcium	9.5	12	Titanium	0.046	0.014
Sodium	9.0	15	Lithium	0.029	0.075
Iron	1.40	1.95	Nickel	0.020	0.110
Boron	1.20	3.70	Silver	0.003	0.000
Strontium	0.45	0.71			

Table 3. Mineral content in the avocado varieties Fuerte and Haas, expressed as mg/100g pulp (Batista, A. et al., 1993).

TRADITIONAL USES

Indians used to call this fruit *auácatl*, which means “testicles” in the *nauátl* language, in reference to the shape of the hanging fruits. Because of its exquisite aroma and taste, early botanists coined the name *P.gratissima*.

In the popular medicine, this fruit is used to strengthen the bones, to improve the vision, to prevent abdominal bloating and to relief cold, catarrh, headache and neuralgia. Avocado oil is topically used to relief the pain from rheumatism and gout. Avocado stimulates appetite, invigorates the nervous system, regulates menstruation and relieves cough.

COSMETIC PROPERTIES

Thanks to the lipids and vitamin A, E and D content of avocado oil, to its extraordinary transepidermal penetration capacity, that pass and nourish the different skin layers, to its high moisturizing and emollient power, that smooth and relax the skin; every day more cosmetic companies add avocado oil in their formulations and beauty products getting excellent results.

Skin barrier repairing activity

Avocado oil is very appreciated in the cosmetic field for its high content in fatty acids and vitamins A, D and E. Because of its chemical composition, avocado oil nourishes deeply, smooths the epidermis and relieves the skin desquamation.

Avocado oil is easily absorbed for the skin where it helps to maintain its barrier function.

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).

Vegetable oils and fats are good emollients, due to their lipophilic nature. These compounds efficiently prevent transepidermal water loss, because of their excellent occlusive properties. A number of studies have demonstrated that the higher the saturation degree of a certain oil, the lower its viscosity and the better its skin penetration (Le Poole, H.A.C., 1995).

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 dermatology (Kraft, JN & Lynde CW, 2005).

Phytosterols are known to be good emulsifiers. Because of this property, these compounds are assumed to facilitate oil penetration into the skin, thus helping improve the skin (Le Poole, H.A.C., 1995).

Vitamin E also has moisturizing activity, because it helps retain water in the skin. Repeated topical applications of vitamin E on the skin significantly reduce wrinkles and skin roughness (Le Poole, H.A.C., 1995).

Vitamin A is essential for normal skin development among other activities. This vitamin offers distinct cosmetic advantages to the skin. Vitamin A is absorbed through the skin, helping it remain soft and plump, and improves the skin's water barrier properties. The latter renders vitamin A useful in treating seasonal/environmental problems (dryness, heat, pollution) and suggest its use in after-sun products for its "normalizing" (corrective) properties. The stimulatory effects of vitamin A tend to oppose changes that occur with ageing. Older skin shows a thinned epidermis; the keratin layer is also thin and ill-formed; and the granular layer is reduced to a single layer of cells containing keratohyalin granules. The metabolic activity of the keratinocytes is also reduced; the dendritic cell population is depleted, etc. All these signs of reduced activity tend to be reversed by the topical application of suitable doses of vitamin A. The skin is activated to produce more epidermal protein and to form a thicker epidermis covered by a better-formed keratin layer. There is evidence that this vitamin can also alter or modulate collagen synthesis (Idson B, 1993).

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

Hair conditioning activity

The vitamin and fatty acid content of avocado oil is of great use to conditioning every type of hair. Its powerful nourishing effect is very useful to repair dry hairs.

Consistent evidences indicate that vitamin E may be important to protect both hair and scalp from excessive heat and dryness, hair breakage from brushing and chemical treatments.

It has been demonstrated that vitamin E is directly absorbed by the hair cortex. Studies were carried out, in which healthy and damaged hair were repeatedly treated (more than 5 cycles) with a shampoo and a conditioner containing 1% vitamin E acetate. The deposition of vitamin E acetate on the hair and its degree of penetration were evaluated. The results revealed that deposition was accumulative. Additionally, better deposition was observed on damaged hair than on healthy hair.

Finally, vitamin E acetate showed better deposition on hair when it was formulated as a component of a hair conditioner rather than as a component of a shampoo (Idson B., 1993).

Thus, avocado oil is recommendable to formulate cosmetic products with hair conditioning activity.

Antioxidant activity

Tocopherols are very efficient antioxidant agents. These active principles protect oils, cell membrane lipids and cell organelles from oxidation; α -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, avocado oil is highly recommendable to formulate cosmetic products to protect the integrity of skin and hair from oxidative processes.

Anti-hair loss activity

Essential fatty acids also have an effect on hair metabolism. Essential fatty acid deficiency brings about skin conditions such as scalp dermatitis, alopecia and hair depigmentation. These symptoms may be reverted by topical applications of linoleic acid-rich oils. Skolnik, P. et al (1977) carried out a study on a 19-year-old male maintained on a 4 months regimen of fat-free, intravenous hyperalimentation fluids. During the treatment period, an essential fatty acid deficiency developed in this patient. This deficiency, as well as all associated skin symptoms, reverted after a 21-day treatment consisting in topical applications of linoleic acid-rich oil.

Vitamin E plays a critical role in hair loss prevention because it stimulates scalp micro-circulation and recovers dystrophic cells in the hair bulbs. Vitamin E stimulates micro-circulation because it helps restore the movements of veins and arteries, thus promoting decongestion (Idson, B., 1990).

Because of these reasons, avocado oil is useful to formulate cosmetic products to treat hair loss.

COSMETIC APPLICATIONS

Action	Active	Cosmetic Application
Restoring skin barrier function	Essential fatty acids Vitamin E, A and D Sterols	-Moisturizing -Emollient -Wound healing
Hair conditioning	Essential fatty acids Vitamin E, A and D	-Hair conditioning -Hair repairing
Antioxidant	Vitamin E	-Anti-aging -Photo-protection -Hair color protection
Anti-hair loss	Essential fatty acids Vitamin E	-Anti-hair loss

RECOMMENDED DOSE

The recommended dose is between 0.5% and 5.0%.

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