



Aloe vera gel eco



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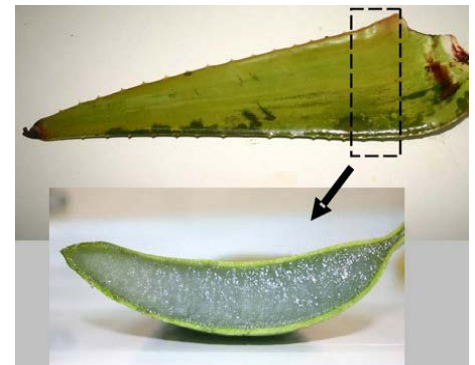


BOTANY

Aloe vera L. (= *Aloe barbadensis* Mill.) is a perennial succulent plant, member of the Asphodelaceae family (former Liliaceae s.l.). This plant grows in semi-arid, tropical and subtropical regions. Its succulent leaves are elongated, lanceolated, up to 50 cm long and 7 cm wide, arranged in a rosette. In young individuals, the leaves seem to grow directly from the ground, while older individuals have a short, thick stem. Flowers are small, tubular, arranged in dense, red or yellow inflorescences.

The leaves are composed of three layers:

- an external coriaceous protective layer (flexible)
- a fibrous layer, just beneath the external coriaceous layer; this fibrous layer contains a bitter substance that protects the plant from predators.
- a gelatinous core, where water is stored; this is used in a number of pharmaceutical products



Aloe vera Gel Eco is a water-soluble fluid produced from *Aloe vera* leaves, coming from organic crops.

CHEMISTRY

Aloe vera gel is a mucilaginous fluid produced exclusively from the pulp of *A. barbadensis* leaves. Its main constituents are polysaccharides. It is used in a number of medicinal applications, mainly for the treatment of skin disorders (Vila Casanovas, R. & Guinea López, M., 2001).

Mucilaginous polysaccharides

Aloe vera gel is mainly composed of mucilaginous polysaccharides, which can retain a large amount of water, thus allowing the plant to live in drought conditions. These polysaccharides contain different proportions of mannose, glucose and galactose, and include: glucomannan, glucomannan with glucuronic acid, galactogalacturonan, glucogalactomannan, galactoglucoarabionomannan and acetylated mannan (Vila Casanovas, R. & Guinea López, M., 2001).

Aloe mucilaginous polysaccharides include acemannan (aloeverose), which has noticeable pharmacological properties and acts as an active ingredient in aloe gel, and aloeride, a high molecular weight polysaccharide composed of glucose, galactose, mannose and arabinose.

Other active principles

Other minor components identified in aloe vera gel can also contribute to the pharmacological action of this product: amino acids, glycoproteins, chromone and pyrone derivatives, saponins, sterols, organic acids and salts, inorganic acids and salts, and vitamins (Vila Casanovas, R. & Guinea López, M., 2001).

Table 2 summarizes the main glucids identified in aloe vera gel.

Glucids		
Acemannan (O-acetylated β -(1-4) mannan)		Galactogalacturonan
Glucomannan		Glucogalactomannan
Glucomannan with glucuronic acid		Galactoglucoarabinomannan
Acetylated glucomannan		Aloeride
Glucose	Rhamnose	Arabinose
Galactose	Xylose	Mannose
Uronic acids		

Table 1. Glucids identified in aloe vera gel.

TRADITIONAL USES

Aloe Vera’s medicinal properties were very well known in the ancient times. Aloe history is full of facts, testimonies and legends. Sumerians seem to have been the first to mention aloe (musabbar) medicinal uses on clay tablets, in the times of the Akkad Kings. Ancient Egyptians used aloe for medicinal as well as for cosmetic applications. It is said that the shine of Cleopatra’s eyes was due to aloe eye drops and that the beauty of Nefertiti’s skin was due to her baths in aloe pulp and asses’ milk.



Greeks considered aloe a symbol of beauty, patience, fortune and health. In one of his treatises, Hippocrates described some healing properties of aloe: he wrote that aloe promotes hair growth and relieves dysentery and stomach ache. During the Punic Wars, Romans learned the healing virtues of aloe from their Carthaginian prisoners, who used this plant to heal their wounds. Dioscorides enthusiastically described the properties of aloe in his *De Materia Médica*, especially its ability to promote blood-clotting and to heal grazes, open sores, boils and hemorrhoids. He also suggested that fresh aloe pulp could stop hair fall and ophthalmia. Pliny the Elder (23-79 A.C.) described, in his *Naturalis Historia*, an original cure for dysentery by applying aloe enema. Bedouins in the Arabian Peninsula and Tuaregs in the Sahara know the virtues of aloe – which they call “Lily of the desert” – since ancient times.

Hindus consider aloe one of the best secret plants mentioned in the Atharvaveda, where it is called “the silent healer”. Aloe is mentioned in several *Holy Books of the Bible*. It is said that the secret behind the longevity of the Templar Knights was the elixir from Jerusalem, made out of aloe pulp, hashish and palm wine. Aloe is one of the 16 sacred plants of Amerindians.

In Japan, aloe is a Queen plant. Aloe can be eaten, drunk and used as a medicine in every form. In former times, samurais used to paint their bodies with aloe pulp before the battle, in order to expel the devils and become immortal. The Chinese pharmacopoeia by Li Shih-Shen (1518-1593) includes aloe among the plants with the best medicinal properties and calls it a “harmony remedy”.

COSMETIC PROPERTIES

Aloe vera gel has been popularly used for years to treat skin wounds, burns, cuts and several other skin disorders. It is also a habitual ingredient in a number of cosmetic products, because of its moisturizing and emollient properties.

Re-epithelizing activity

During the last few years, a number of studies have been published, which confirm the wound healing properties of aloe gel. The quick improvement and healing of wounds result from the synergic actions of different constituents in aloe gel, which stimulate fibroblast growth, angiogenesis and re-epithelization, and reduce the inflammatory phase. The outcome is an increase in collagen and glycosaminoglycans in the new repaired tissue. The active compounds responsible for these actions are: cell proliferation-promoting glycoproteins, allantoin and other low molecular weight components, which promote re-epithelization and angiogenesis, as well as sugars, polysaccharides and phenol compounds, which have anti-inflammatory and antimicrobial effects.

The beneficial effects of aloe gel on the skin can be observed, not only on incision wounds, but also on other lesions. For example, in 1935 aloe vera gel was first reported to heal acute radiation-induced dermatitis. Ever since, a number of studies have reported successful use of aloe on radiation-, heat- or freezing-induced skin



burns and on chronic ulcers. In these cases, the observed pain relief and accelerated healing are related to the ability of aloe gel to reduce the concentration of thromboxans (powerful stimulators of pain and vasoconstriction in this type of lesions) and to stimulate the proliferation of fibroblasts, lymphocytes and neuronal cells.

In 2009, Mendonça, F.A., et al., carried out an *in vivo* study on the effects of the application of aloe vera to wounds in animals, as the sole treatment as well as in conjunction with other treatments. The group treated with the gel showed an accelerated improvement in the condition of the wounds compared to the control group. This shows that Aloe Vera gel helps in wound closure and its implicit processes.

Other applications for aloe gel include various mucous membrane and soft tissue disorders, proving beneficial in certain pathologies involving the buccal cavity, aphthous ulcers and stomatitis. Likewise, acemannan has been recommended as an innocuous and effective agent in the formulation of dental adhesives (Vila Casanovas, R. et al., 2001).

Further applications of aloe vera gel are related to conditions affecting mucosa membranes and soft tissues. Aloe is beneficial to treat some mouth pathologies, thrush and stomatitis. Furthermore, acemannan has been proposed to be a harmless and efficient ingredient for the formulation of dental adhesives (Vila Casanovas, R. et al, 2001).

Therefore, Aloe vera Gel Eco is recommended to formulate cosmetic products with soothing, re-epithelizing and moisturizing activities.

Anti-inflammatory activity

Much research has been done on the inflammatory activity of aloe gel, in order to identify its active principles and describe the corresponding action mechanisms. Research has been conducted using different animal inflammation models such as mice ear edema, rat plantar edema induced by a wide range of irritants and carrageenan and air pouch induced granuloma.

It has been reported that the agents responsible for the anti-inflammatory action are chromones and sterols, because they inhibit prostaglandin synthesis and reduce lymphocyte migration and infiltration. Moreover, glycoproteins block antigen binding to the receptors on mast cells surface, thus reducing histamine release and leukotriene synthesis and secretion. Furthermore, the phenol compounds fraction contributes to modulate inflammation, because of its antioxidant action and its inhibitory action on leukocyte metalloproteinases, which reduce the deleterious effects of these mediators.

Other gel components also involved in the anti-inflammatory action are: magnesium lactate, which inhibits histidine decarboxylase and consequently, the conversion of histidine into histamine in mast cells, and salicylates, which inhibit prostaglandin production from arachidonic acid by inhibiting cyclooxygenase. Research studies have demonstrated that both commercially available aloe gel and aloe extract significantly inhibit arachidonic acid oxidation *in vitro*.



Such anti-inflammatory effects of aloe gel contribute to explain the above mentioned healing actions on skin wounds, burns and ulcers, as well as the observed improvement of joint inflammation and arthritis. In the later pathology, progressive joint destruction occurs because different neutrophil metalloproteinases degrade collagen, elastin and proteoglycans in the

connective tissue. The phenol constituents in aloe gel might stop this degenerative process by inhibiting metalloproteinases' action and by reducing the oxidative processes produced by neutrophils.

In 1996, Vázquez, B. et al., performed a study which proved that aloe vera gel has anti-inflammatory effects on induced edemas. Different gel extracts were studied. It was observed that they reduced the edema and inhibited the action of compounds involved in inflammatory processes. Therefore, aloe vera gel's properties as an inhibitor of inflammation and its consequences have been confirmed.

On the other hand, a later study (Somboonwong, J. et al., 2000) also attested to the anti-inflammatory and curative properties of aloe vera gel on second degree burns in animals. The gel was topically applied on the wounds for 14 days. The results indicated that circulation and burn healing were significantly higher in the group treated with the gel. This gel's pain-relieving and anti-inflammatory effects on burns and wounds have thereby been verified.

Therefore, Aloe vera Gel Eco is recommended to formulate cosmetic products with calming and anti-inflammatory activity.

Immuno-modulatory activity

Aloe vera gel contains different macromolecule types, mainly polysaccharides and glycoproteins, which can interact with the components of immune cells surface, inducing agglutination or modifying the response to

a certain stimulus. The polysaccharide acemannan and, more recently, aloeride have been reported as the main agents producing immuno-modulatory action.

Some researchers have suggested that the basis for aloe gel wound healing effects on infected wounds is the diffusion of polysaccharides through the dermis, which locally activate the C3 level of complement. Recent studies have demonstrated that acemannan stimulates the formation of macrophage and leukocytes, activates macrophage phagocytosis and induces NO synthesis in these cells. It has also been reported to increase cytokine release, to stimulate the interactions between macrophages, T-lymphocytes and B-lymphocytes, to promote formation of T cytotoxic lymphocytes, to stimulate the activity of NK cells and to induce maturation of immune dendritic cells. Other, lower molecular weight, constituents are also efficient in the same actions.

Table 3 summarizes the immunostimulatory mechanisms of acemannan.

<p>↑ Formation of macrophages and leukocytes</p> <p>↑ Formation of T-cytotoxic lymphocytes</p> <p>Stimulation of NK cells activity</p> <p>Activation of macrophage phagocytosis</p> <p>↑ Cytokine release</p> <p>↑ Maturation of dendritic cells</p>
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Table 3. Immunostimulatory mechanisms of acemannan

The activation of the immune system slows down with aging. Products including aloe vera gel stimulate this system reducing its effects. Thus, these active principles also have protecting anti-aging effects.

Therefore, Aloe vera Gel Eco can be recommended to formulate cosmetic products with skin protective activity.

Moisturizing activity

Aloe vera is often used to treat skin lesions because of its emollient and soothing actions, which are mainly due to its mucilage content. Mucilages are hygroscopic – they absorb and retain water under certain conditions – a property that makes them good moisturizing agents.



Therefore, Aloe vera Gel Eco is of great use to formulate cosmetic products with skin repairing and conditioning activity.

Finally, we would like to mention that the publication *Plants preparations used as ingredients of cosmetic products. Vol I.* (Council of Europe, 1994) includes a monograph on the aloe vera gel extracted from the inner part of *Aloe vera L.* leaves, which attributes the following cosmetic effects to this plant:

- Moisturizing, emollient, aftersun, lenitive, soothing

Up to 30% gel in pre- and after-sun products. Sensitive

and delicate skin care products.

- Other possible effects: products for the relief of insect bites, itching and sunburn

BIBLIOGRAPHIC STUDY

Aloe vera gel has been used for many years for the treatment of wounds and of damaged, delicate and problematic skin. Therefore, in 2003 West, D.P. et al., wished to prove the effectiveness of this gel on mistreated skin due to daily manual labor, particularly on irritated and dry skin.

1. Experimental Method

The curative capacity of aloe vera was evaluated among three groups of 10 volunteers each (more than 25 years old). The volunteers were performing manual labors that caused continuous damage and irritation to their hands, hence the reason for implementing the study in this area. Application of the gel was carried out using gloves with sustained release technology, which guaranteed a continuous application of the gel. The gloves were internally impregnated with a 25% aloe vera gel solution that was desiccated and remained intact until contact with the volunteer's skin. The study compared treated and untreated areas.

The study allowed for observation of the gel's effects on the skin after glove usage for 30 days (8 hours daily), followed by 30 days of non-use of the gloves and 10 days more of glove usage, to establish contrasts. Skin conditions were recorded at the beginning, during and at the end of the study by means of photographs, calculating average values and statistical analysis of said values (Wilcoxon test).



2. Results

Using each volunteer's initial values as a basis, the results indicated that the quality of hand skin treated with aloe vera gel showed moderate improvement after an average of 3.5 days. After an average of 10.4 days of treatment the skin showed marked improvement, in comparison with absolutely no improvement in untreated skin.

Upon termination of the study the values of the untreated hands and treated hands were compared, with a zero value given if no improvement was noted, a value of one given if the skin showed a slight general improvement (10-89% improvement), and a value of two given if there was a marked general improvement (90-100% improvement). Treated hands had an average value of 1.3 as compared to a zero value for untreated hands. The volunteers' own opinions were also taken into account. The results were a value of 2.0 assigned to the treated areas and a value of 0.0 assigned to the untreated areas.

3. Conclusions

The results clearly demonstrated that sustained topical application of aloe vera gel rapidly improves skin quality and condition, on a continuous and lasting basis, even when the skin is under constant duress. It was observed that the quality and general aspect of the skin was improved. Erythema was also reduced, as well as wrinkles due to dehydration and other problems caused by daily wear and tear due to manual labors.

Therefore, it is established that the Aloe Vera Gel Eco is highly recommended and useful for cosmetic products, due to its soothing, protective, skin regenerating and anti-aging properties.

COSMETIC APPLICATIONS

Action	Active	Cosmetic Applications
Re-epithelizing	Glycoproteins Alantoin Sugar Polysaccharides Phenol compounds	-Re-epithelizing -Anti-aging -Mature and damaged skins
Anti-inflammatory	Chromones Sterols Phenol compounds Magnesium lactate Salicylate	-Sensitive/irritated skin -Calming
Immuno-modulatory	Polysaccharides Glycoproteins	-Skin protection -Anti-aging -Sensitive skins
Moisturizing	Mucilage	-Moisturizing -Soothing -Refreshing

RECOMMENDED DOSE

The recommended dose is between 0.5% and 10.0%.

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