Green nutrisea

**BOTANY**

*Caulerpa lentillifera* is an algae made up of Green tiny balls, that is why it is known as Green caviar.

It is a single multinucleate cell, so it is considered to be among the world's largest cell. It can grow up to 10 centimetres in height. It has superficial, branched (up to 200 branches) and cylindrical stolons that can measure between 1 and 2 mm in diameter and 3 meters long, where we can appreciate small balls with a grape-like appearance.
C. lentillifera is generally found on sandy to muddy substrates on coral reefs or rocks, and is distributed around the world, but especially in Japan, Indonesia, China, Philippines, Taiwan and Australia.

It is a stenohaline seaweed, which means it cannot handle a wide fluctuation in the salt content of water; in this case, it cannot live in areas with less than 25% of salinity. A change in the environment salinity prevents its growth.

Green nutrisea is obtained from the seaweed Caulerpa lentillifera.

**CHEMISTRY**

Green caviar is an alga rich in:

- **Polysaccharides**: 1,4-α-glucans and 1,3-β-D-glucans (Shevchenko, 2009).
- **Sterols** (Shevchenko, 2009).
- **Proteins**: with the essential amino acids (threonine, valine, lysine, isoleucine, leucine, phenylalanine) and non-essential (aspartic acid, serine, glutamic acid, glycine, arginine, etc.) (Kasetsart, 2006).
- **Vitamins**: vitamin B1, B2, B3, and B9, vitamin A (α and β carotene), vitamin E (tocopherols) and vitamin C.
- **Micronutrients**: sodium, potassium, calcium, magnesium, phosphorus, iron, copper, manganese and zinc.
- **Fatty acids**: Polyunsaturated (omega 3 and 6) as linolenic acid, linoleic acid, arachidonic acid, oleic acid, palmitic acid, palmitoleic acid, myristic acid and icosapentaenoic acid.
TRADITIONAL USES

Green caviar is popular in various regions of the world, such as Philippines, Japan, Malaysia or Indonesia, where it is eaten fresh or salted. It has a refreshing flavour and a soft and succulent texture.

The seaweed is high in minerals and it has been traditionally used as antibacterial and antifungal, and to treat high blood pressure and rheumatism.

COSMETIC PROPERTIES

Skin and hair conditioning activity

This activity is due to its content in proteins and polysaccharides. Challoner NI et al (1997) evaluated the moisturizing effects of different proteins. In a first assay, they evaluated the moisturizing effects of an O/W emulsion containing 1% of a protein hydrolysate. The results showed that the emulsion containing the protein hydrolysate significantly increased immediate skin extensibility (Ei).

They also evaluated the tightening effects of two high molecular weight proteins in aqueous solution. The results showed that incorporating proteins into an aqueous formulation significantly decreased Ei during the treatment period. This finding could be explained by the ability of proteins to form a coating film on the skin surface, which resulted in tightening effects.

Thus, low molecular weight proteins are good moisturizing agents for deep skin layers, while high molecular weight proteins, due to their filmogenic action, are better for surface moisturizing and for giving the skin firmness and smoothness.

Green Nutrisea has β-glucan, which is structurally similar to hyaluronic acid, an extensively used material to produce high-viscosity preparations and as a skin moisturizing and smoothing agent. Comparative flow curves for hyaluronic acid 1% and β-glucan (which plot viscosity response versus shear strength) show that even when the viscosity behaviours of both compounds are not identical, each one behaves as a pseudo-plastic fluid, namely their viscosity decreases as the shear strength increases. Thus, β-glucan is a helpful agent to form a film, moisturize and lubricate.
Sugars, carbohydrates, mineral salts and amino acids are hygroscopic. All of them are present in Green nutrisea and build hydrogen bonds, thus preventing massive water loss and reducing dehydration. Additionally, some of these compounds make a protective coat on the skin, thus preventing and slowing down transepidermal water loss.

Therefore, Green Nutrisea is a good moisturizer and is recommended to formulate skin conditioning cosmetics.

**Restorative and anti-aging activity**

**Proteins**

Proteins have affinity for skin and hair, which makes them beneficial in dermatological processes. Their main actions are: moisturizing, improving elasticity, soothing and firming. However, not all of the proteins show these properties to the same degree.

The functionality of these proteins is closely related to their structure and molecular weight. Low molecular weight proteins (<1000 Da) and amino acids show good skin penetration power. High molecular weight proteins (>80000 Da) show poor penetration power, but remain on the stratum corneum, where they act as excellent filmogenic agents (Griesbach et al., 1998).

**Lipids**

Several clinical studies have shown that topical application of fatty acids (and their polyunsaturated derivatives) soothes the skin and considerably reduces transepidermal water loss (Wright S., 1991). Conti A. et al. (1995) and Jiménez-Arna A. (1997) also verified these properties of fatty acids.

**Vitamins**

In terms of beauty and functionality, current studies indicate that certain vitamins and their derivatives enhance the performance of cosmetics and toiletries. Furthermore, laboratory and clinical tests provide strong evidence that these vitamins, used in proper amounts, play an important role in the protection, correction, and renewal processes of skin. Laboratory and clinical studies indicate that topically applied vitamins are beneficial to treat several skin disorders and especially to prevent, delay or arrest certain age-associated degenerative changes, such as skin dryness and desquamation, as well as the formation of wrinkles.
Furthermore, the naturalness of vitamins has prompted their use in creams and lotions to maintain a soft and smooth skin by “replenishing nature’s moisture”. Of particular interest to cosmetic formulations are vitamins E, A, and C. These vitamins are functional, they penetrate the skin and, when used in proper amounts, they are safe and free of side effects (Idson B, 1993).

Furthermore, vitamin A becomes interesting for its regenerating properties and its effects in healing wounds as it increases epithelisation, collagen synthesis, fibroplasia and angiogenesis, apart from being important for the right function and maintenance of the immune system, and its stimulation (Keller, 1998; Reifen, R., 2002).

Applied topically, vitamin A helps to maintain the normal conditions of the skin, contributes the proper skin metabolism, improves scars and dryness, and it also diminishes notably the effects that age causes on skin (CIV., 1992; Campos, PM., 1998).

The effects of vitamin A on the skin are several: activates the production of dermal proteins, the construction of a thicker epidermis with a better keratin layer, modulates the collagen synthesis, stimulates general metabolism of cells and their mitosis, increases skin elasticity and softness, and it is essential to reproduce basal cells and its perfect differentiation (Idson, B., 1993).

Minerals

The present minerals also help to maintain good status and functioning of the skin and hair, which are involved in important cellular processes (maintenance of homeostasis, permeability and cell balance, preserve the extracellular matrix and its components, such as collagen and elastin, and provide energy).

Green Nutrisea is highly recommended to formulate cosmetic products with emollient restorative, anti-aging, emollient and conditioning activity of skin and hair.

Vitamin and mineral replenishing activity

Green caviar has a potential of nutrients in a natural balance, which allows absorption, thus restoring nutrient deficiencies in different organs and tissues, recovering skin and hair vitality and to improve their appearance.
Calcium is involved in a number of enzymatic processes in the organism, especially in the formation of bones and epidermal tissue.

Magnesium is a relevant mineral for a number of systems related to ATP metabolism and synthesis of carbohydrates, lipids, proteins and nucleic acids. It plays a major role in the homeostasis of a number of organs, particularly during reparation processes after injury. It is probably involved in the enzyme activation leading to transfer of a phosphate to or from ATP and acts as an enzymatic substrate (Lansdown, A.B.G., 1995).

Human and animal skin absorbs sodium and potassium at a rate that depends on the concentration, the applied salt, the skin morphology, the treated area and the density of skin appendages (Lansdown, A.B.G., 1995).

Sodium and potassium are closely linked to a number of physiological processes in the mammalian organism, particularly to the function of cell membranes and the mechanism of the sodium-potassium pump. One of the main effects attributed to the sodium-potassium pump is to maintain cell homeostasis and volume (Lansdown, A.B.G., 1995).

Therefore, Green Nutrissea is highly recommended to formulate cosmetic products with skin or hair stimulant, antioxidant, moisturizing and revitalising activities.
COSMETIC APPLICATIONS

<table>
<thead>
<tr>
<th>Action</th>
<th>Active</th>
<th>Cosmetic application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin and hair conditioner</td>
<td>Polysaccharides</td>
<td>Moisturizing</td>
</tr>
<tr>
<td></td>
<td>Proteins</td>
<td>Smoothing</td>
</tr>
<tr>
<td></td>
<td>Mineral salts</td>
<td>Conditioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proteins</td>
<td>Moisturizing</td>
</tr>
<tr>
<td>Skin restorative and anti-aging</td>
<td>Vitamins</td>
<td>Emollient</td>
</tr>
<tr>
<td></td>
<td>Minerals</td>
<td>Firming</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repairing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anti-aging</td>
</tr>
<tr>
<td>Vitamin and mineral replenishing</td>
<td>Vitamins</td>
<td>Tonifying</td>
</tr>
<tr>
<td></td>
<td>Minerals</td>
<td>Revitalizing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hair care</td>
</tr>
</tbody>
</table>

RECOMMENDED DOSE

The recommended dose is 0.5% - 5.0%.

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