

Acai eco



CareMotives

EcoCares

Anti-aging



Acai eco



BOTANY

Euterpe oleracea (= *Catis martiana* O.F.Cook., *Euterpe badiocarpa* Barb.Rodr., *Euterpe beardii* L.H.Bailey, *Euterpe brasiliiana* Oken) belongs to the Arecaceae family and it is commonly known as Acai, Huasaí, Cabbage palm or palm tree, Tucum, Manaka palm, Pina palm, Naidí palm or Morroke.

This monoecious palm tree with multiple stems, sometimes slightly inclined, can reach 10-20 m high and 7-18 cm in diameter, with roots that often appear on the surface. It has 4 to 8 well developed stems and the pinnate leaves are 2 to 3 m long. They are arched, hanging leaves, with the bases forming a green or somewhat brown capital, and they are found in groups between 8 and 14 per trunk. They have abundant, linear and hanging leaflets. Spike inflorescences with flowers purple in color and 2 mm in diameter emerge from the lower part of the capital and are covered with whitish-brown hairs. The globose fruit is dark purple or purplish black in color and 1-2 cm in diameter. Each fruit has a hard brown seed, 6 mm in diameter.

Well adapted to subtropical and tropical areas, it requires mild climates with protection from direct sun in the early years. It needs rich soils, even if they are not very well drained. It grows in humid forests of the lowlands, in flooded and brackish areas near sea level and on river plains (below 200 m altitude), forming an association called naidizal, which appears as transitional forest between the mangrove swamp and the tropical humid forest.

This fast growing palm tree is native to northern South America, where it is appreciated for its nutritious fruit. It grows in northern Brazil, Colombia, Venezuela, Ecuador, French Guyana, Surinam, Guyana, Trinidad and Venezuela, and in the



Magdalena Medio and the Pacific region in Colombia. Brazil is one of the main producing countries and the biggest exporter of palm heart.

Acai Eco extract is obtained from the fruits of *Euterpe oleracea*, coming from organic crops.

CHEMISTRY

The acai fruit has a varied chemical composition, which includes an important amount of carbohydrates (31-52% in dry matter), lipids (33-49%), proteins (8-16%) and several minerals (particularly, it has a high level of potassium, calcium, phosphorus and iron, and smaller amounts of sodium, magnesium, zinc, copper, phosphorus and sulfur). In addition, acai contains anthocyanins (cyanidin-3-glucoside, cyanidin-3-rutinoside), proanthocyanins, other flavonoids (orientin, scoparin, isovitexin), tannins, carotenoids, lignans, sterols (β -sitosterol, campesterol and stigmasterol), vitamins (A, C, E and group B vitamins), resveratrol, and aspartic, glutamic, myristic and arachidic acid (Schauss, A.G. et al, 2006).

It is worth noting that the fruit is particularly rich in fatty acids, the unsaturated fraction being the most abundant, and specifically monounsaturated acids (60%), especially oleic acid.

Among the antioxidant compounds found in the fruit, it is interesting to mention the high proportion of polyphenols, tannins and anthocyanins (Table 1).

Antioxidant compounds in g/100 g dry fruit	
Polyphenols	2.2-5.0
Tannins	0.7-1.4
Anthocyanins	0.7-1.6

Table 1. Approximate antioxidant composition of the acai fruit (Schauss, A.G. et al, 2006; Sanabria, N. et al, 2007)

TRADITIONAL USES

The consumption of acai dates back to pre-Columbian times and it is a very important food in the Amazon diet. Its cultivation spread in the 80s and 90s, as it is an ingredient very commonly used in beverages, sweets and even ice cream.

The main marketed product obtained from acai is the palm heart, which is eaten in salads or stored in tins. The palm heart is extracted by knocking down the palm trees, which deteriorates the state of the local ecosystem and it is not a sustainable



practice. Therefore, there is considerable controversy around the consumption of palm heart and a parallel activity has been developed for the use and trade of the plant in a sustainable way. Acai is cultivated to obtain fruits every year so plants are not cut down, avoiding the damage to the ecosystem. These fruits are used for consumption and for several applications, including food and cosmetic applications. Additionally, their stems are used as rafters in roof construction, and paper and cellulose can be obtained from their leaves and stipe.

The fruits have been traditionally used by natives of the Amazon to increase vitality and promote healthy living. In Europe and America, the fruit has started to be marketed as a food supplement in the form of energy bars, juice, sweets or even as the whole fruit, for its energy and nutrient value. Recently, acai has been classified as a "superfruit" (like goji and acerola), as it acts as a general tonic for the body, providing strength and energy to anyone who takes it. Moreover, it provides fiber, it improves digestion, cholesterol levels, sleep, skin and heart health, and it helps slimming.



The fruit also has medicinal properties against fever, malaria, jaundice, diabetes, bleeding, muscle aches, and liver and kidney diseases. Moreover, it is said that it has a very powerful antioxidant activity, being 33 times higher than that of grapes (powerful antioxidants), and that it leads to a longer life. In 2010, Sun, X. et al confirmed that the acai included in the fat-rich diet of animals extended their life, versus a control group without acai. This action was due to its control over the effects caused by aging and oxidative stress.

COSMETIC PROPERTIES

Antioxidant and protective activity

Several studies have been conducted on acai that confirm the antioxidant and protective properties of its components separately and of the whole fruit.

In 2008, the presence of lignans in the fruits of acai was detected. Also, the antioxidant activity of many of its components was confirmed in an *in vitro* assay on hydroxyl radicals (Chin, Y.W. et al).

In 2009, Oliveira de Souza, M. et al carried out an *in vivo* study on the antioxidant activity and hypocholesterolemic effects of acai pulp in animals with a normal or high-fat diet. Animals were given a standard diet (control) or a high cholesterol



diet, which were supplemented with acai for 6 weeks. Results showed that acai reduced total cholesterol, low density lipoproteins and sulfhydryl groups (free and total). It also significantly reduced peroxide dismutase activity. These results confirm that acai improves the *in vivo* oxidative state and acts stopping oxidative processes.

In the same year, Ribeiro, J.C. et al showed in an *in vivo* study that pre-treatment with acai protects against induced genotoxic effects. Therefore, it is confirmed that it also protects against oxidative processes that affect cellular DNA, such as UV radiation.

Phenolic compounds are powerful antioxidants which protect cells from oxidative damage in many ways (Beltrán, I., 2003):

- Due to its anti-radical action, scavenging free radicals and reducing their generation.
- Due to its ability to inhibit, activate or protect specific enzymes in the body.
- Decreasing the consumption of their own antioxidants, such as vitamin E and carotenoids.

Several studies show that polyphenols have the ability to inhibit the enzymatic activity of metalloproteinases, and specifically of collagenase, responsible for the degradation of structural components of the extracellular matrix (collagen) and the vascular endothelium (Morazzoni, P. et al, 1995; Makimura, M. et al, 1993).

Among the flavonoids, it has been demonstrated that some anthocyanins have radical scavenging activity and a powerful antioxidant effect (Hanamura, T. et al, 2005). Anthocyanosides also have antioxidant, anti-inflammatory and antiplatelet activity (López Luengo, M.T., 2002).

In addition, various studies conducted over the last decade on resveratrol have shown that it also has antioxidant activity. Specifically, it has been proved that it reduces oxidative damage in the DNA of neuronal cells, and it also offers an anti-aging action (Nazar, L., et al, 2006). It has been shown to lengthen the longevity of organisms such as flies and yeast, and in humans it delays the onset of age-related diseases (Orallo, F., 2008).



Vitamin C is a powerful antioxidant with radical scavenging activity, capable of neutralizing radicals generated by UVB rays. A study on animals confirmed a reduction in both UVB-induced erythema as well as skin burns caused by it, when pretreated with vitamin C at 10%. Ascorbate can also have similar protective effects against UVA rays, as a different study reported a reduction in the burns caused by UVA rays on pig skin that had been previously sensitized with psoralen. Other models carried out on human skin showed similar effects, either using only ascorbate or combining it with vitamin E (Chiu, A. et al, 2003).



Therefore, Acai Eco is very useful for the formulation of cosmetic products designed to protect the integrity of skin and hair against oxidative processes.

Activity on circulation

Flavonoids are used in the treatment of blood vessel disorders, such as varicose veins, chronic venous insufficiency (CVI), low capillary resistance, etc. This protective effect is due to their high affinity for proline-rich proteins, such as collagen and elastin. These proteins are structural components of veins, and their degradation, caused by proteases, weakens blood vessels, inducing edema formation and swelling of the lower limbs. It has been observed that the oral administration of flavonoids has effectively improved capillary resistance on animal models.

The RELIEF study (“Reflexus assessment and quality of life improvement with micronized flavonoids in chronic venous insufficiency”) is a controlled, multicenter study conducted between 1997 and 1998 in 23 countries around the world involving over 10,000 patients with CVI. These patients were treated with a purified flavonoid fraction for 6 months. The results showed that pain, heaviness in the legs, swelling and cramps, as well as edema (if present), significantly improved with the application of the flavonoid-based treatment (Spignoli, G., 2000).

In some studies based on the diffusion of dyes, it has been seen that anthocyanosides decrease the permeability of capillaries and increase their resistance. Its activity could be linked to the involvement of vascular wall collagen in the control of vascular wall permeability, and partly also to an inhibition of proteolytic enzymes of collagen degradation (elastase, collagenase). Anthocyanosides, like other flavonoids, reduce capillary fragility and increase their resistance, and thus have a beneficial effect on the capillary and venous vascular system.

The properties at a capillary-venous level enable the use of extracts with anthocyanosides in the symptomatic treatment of disorders related to insufficient lymphatic drainage and capillary fragility (Bruneton, J., 2001).



In consequence, Acai Eco is useful to formulate cosmetic products with toning and general circulation stimulating activity.

Nourishing and repairing activity

Acai has a very wide chemical composition with a lot of minerals, vitamins and nutrients which are beneficial for skin and hair.

Sodium and potassium, for example, are two minerals found in acai which control muscle protein synthesis and stimulation through the sodium and potassium pumps. They regulate skin's hydric balance so it is essential to maintain an adequate level of both. They provide balance in situations with strong perspiration and loss of minerals, at high temperatures with high humidity levels, in situations of stress or even during pregnancy. Acai is as well rich in iron and its also high content of vitamin C helps this element being absorbed better. Therefore, it may be useful to restore iron concentrations in athletes and to activate skin cells, as it is essential for the arrival of oxygen and for the proper functioning of skin cells. Moreover, calcium is involved in many processes, especially in the formation of bone structure and the construction of epidermal tissue.



In addition, vitamin C is an essential cofactor in the synthesis of collagen, proteoglycans and other components of the extracellular matrix. Vitamin C deficiency causes abnormal collagen fibers and alterations in the extracellular matrix, which manifests as skin lesions, low endothelial cell adhesion, and decreased tensile strength of fibrous tissue. Furthermore, topical application of vitamin C causes an increase in mRNA synthesis of collagen and of metalloproteinase-1 inhibitor of the extracellular matrix (Chiu, A. et al, 2003), and it is also efficient to close and heal wounds (Lima, C.C. et al, 2009).

Therefore, Acai Eco is highly recommended for the formulation of cosmetic products with firming and healing properties.

BIBLIOGRAPHIC EFFICACY STUDY

Acai is a natural species from South America whose fruit is widely used to invigorate and as a very powerful antioxidant. The aim of this study was to verify the activity of its fruits against different reactive oxygen species known to cause harmful oxidative damage that degenerates in premature cell aging.



1. Experimental method

The antioxidant properties of acai were assessed *in vitro* by Schauss, A.G. et al, in 2006 using several assays to obtain wider and more comprehensive results. In this study, the antioxidant capacity of the acai fruit was evaluated through a series of tests to measure the Oxygen Radical Absorption Capacity with fluorescence (ORAC_{FL}), including lipophilic assays (LORAC), hydrophilic assays (HORAC) and assays of peroxy nitrates and hydroxyl radicals. In addition, some studies about its superoxide radical scavenging ability and about the inhibition of the formation of reactive oxygen species (ROS) were also conducted on human neutrophils.

2. Results

The results of the ORAC assays show that acai has a much higher antioxidant capacity than any other fruit or vegetable studied to date, since its results are the highest in the LORAC and HORAC test, expressed as Trolox Equivalents (TE). The values obtained in the LORAC test analyzing fruit ranged from 0.05 $\mu\text{mol TE/g}$ (Golden apples without skin) to 5.52 $\mu\text{mol TE/g}$ (avocados). In vegetables, values ranged from 0.09 $\mu\text{mol TE/g}$ (beetroot and beans) to 6.36 $\mu\text{mol TE/g}$ (peas). Based on this reference, acai has a much higher value of 29.60 $\mu\text{mol TE/g}$ (Wu, X., et al, 2004).

The same applies to the HORAC test, where the values obtained in fruit ranged from 1.23 $\mu\text{mol TE/g}$ (melon) to 92.56 $\mu\text{mol TE/g}$ (blueberry). In vegetables, values ranged from 0.87 $\mu\text{mol TE/g}$ (cucumber skin) to 145.39 $\mu\text{mol TE/g}$ (red beans). Acai obtained a much higher result, with a value of 996.9 $\mu\text{mol TE/g}$ (Wu, X., et al, 2004).

The result of its ability to scavenge superoxide radicals (1.614 units/g) was also much higher than that of fruits and vegetables that had been tested in earlier studies. This is a very important parameter to preserve the body's overall antioxidant capacity.

The study of its capacity to scavenge ROS yielded very positive results, as acai clearly inhibited their formation. It is worth mentioning that, as this was a study conducted on human cells, it is even more relevant, as it is close to a more realistic situation on the skin. In addition, acai was effective at very low concentrations (10 ppm), significantly reducing the harmful effect of hydrogen peroxide.

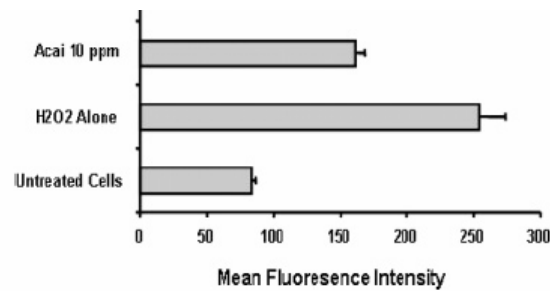


Figure 1. Acai reduces the H₂O₂-induced formation of reactive oxygen species (ROS) in human neutrophils

3. Conclusions

Results clearly show that the acai fruit acts at different levels reducing the emergence and action of various free radicals that are associated to significant oxidative damage. Therefore, and because it is already effective at very low concentrations, its potential to alleviate the negative effects caused by free radicals in skin cells is demonstrated.

For this reason, it is confirmed that Acai Eco is highly recommended and useful for cosmetic products with antioxidant, anti-aging and hair coloration protecting activity.

COSMETIC APPLICATIONS

Action	Active Ingredient	Cosmetic Application
Antioxidant and protective	Polyphenols Anthocyanins Resveratrol Vitamin C	-Anti-aging -Photoprotection -Protection of hair coloration
Activity on microcirculation	Flavonoids	-Stimulating -Toning
Nourishing and repairing	Vitamins Minerals	-Nourishing -Repairing -Healing



RECOMMENDED DOSE

Recommended dosage ranges between 0.5% and 5.0%.

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