

# BERACA



**RAIN FOREST 04410  
(REFINED AÇAÍ OIL)**



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**BERACA** presents a wide portfolio composed of fixed oils, butters, scrubs, clays and actives sustainably sourced from the Brazilian biodiversity. The ingredients come from extractive communities throughout Brazil and are manufactured to connect our biodiversity with thousands of consumers around the world. Through a relationship marked by transparency, traceability and innovation, Beraca contributes directly to regional development and environmental preservation.



## GENERAL INFORMATION

**Product Code:** BR04410B

**Related codes:** BR04410BA00, BR04410BB46, BR04410BD19, BR04410BX15, BR04410BX18, BR04410BX36, BR04410BX45

**Previous code:** RF4410

The *Euterpe oleracea* species belonging to the Arecaceae family, is a plant native to the Amazon region. The fruits, known as Açaí, are globose drupes, 0.5 cm in diameter that have adhered floral residues. The fruit is brown-violet in color and contains an oil and edible pulp. The seed has a hard, fibrous core. The açaí palm grows in clumps, consisting of several stems that can reach 5 to 6 feet in each clump. Each stem produces annually from 5 to 8 fruit clusters.

## COSMETIC USE

Açaí oil, extracted from the fruit pulp, contains polyphenols which are powerful natural antioxidants. The antioxidant components of this oil have the ability to inhibit or reduce the oxidation processes generated by free radicals. In addition to the antioxidant capacity, the lipid composition of the açaí oil may be involved in reducing the inflammatory process.

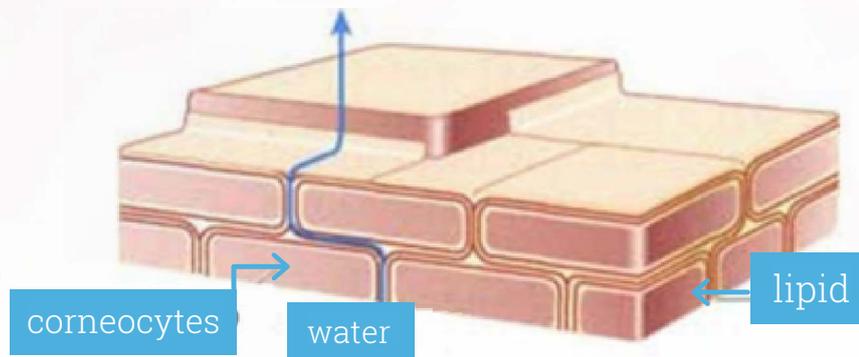
Thus, the polyphenols present in this oil have the ability to act as antioxidants, reduce inflammation caused by UV radiation, making açaí an excellent option to be included in sunscreen formulations, serum, creams and anti-aging lotions, shaving products and aftershave, shampoo, conditioners and leave-in.

## EFFICACY EVALUATION

### INTRODUCTION

The skin is the largest organ of the human body, divided into three layers (epidermis, dermis and hypodermis) being responsible for the mechanical protection, coating, sensory functions, thermoregulation, among other functions.

The stratum corneum is the first layer of the epidermis, being formed by cells called denominated corneocytes, connected by a complex lipid matrix (Figure 1). This layer presents approximately 10 to 20% of water, and the percentage of hydration depends on the balance between the supply of water to skin and the loss of the water through evaporation. The water loss depends on the quantity of layers of corneocytes. The greater the number of layers, the greater the path to be followed by the water, the lower the evaporation.



**Figure 1.** Schematic representation of the stratum corneum, the corneocytes and illustrating the lipid layer between them.

One of the harmful factors to the skin is dehydration. Besides the natural evaporation, some external factors may influence on the dehydration of the skin or destruction of the protective barrier, such as low atmospheric humidity, pollution, very low temperatures and the use of products abrasive to the skin, such as solvents, detergents, soap in excess and some other chemicals. The degree of water loss depends on the intensity of exposure to those factors.

Dehydrated skin presents a dry appearance, without firmness, elasticity or vigor. The use of moisturizing cosmetics can prevent the loss of water in two ways: by forming a barrier against the superficial evaporation or hydrating the stratum corneum (by water contained in these formulations or by absorption of atmospheric water).

In this context, Beraca presents the **RAIN FOREST 04410 (REFINED AÇAÍ OIL)**, with proven efficiency in the preservation of skin moisturizing and decrease in transepidermal water loss.

## OBJECTIVE

The aim of the studies was to evaluate moisturization of the superficial layer of the skin by corneometry and TEWL methods (transepidermal water loss) in subjects undergoing topical treatment with REFINED AÇAÍ OIL in a moisturizer.

## METHODS

### 1. Laboratory

The study was conducted at the independent laboratory *Kosmoscience Ciência & Tecnologia Cosmética Ltda.*  
*Study reference:* BC011-08 - R0.

### 2. Experimental groups and treatments

Experimental groups and their respective treatments for corneometry and TEWL assessments are listed in the following Table 1.

**Table 1.** Products used in the study. protocol BC011-08 - R0.

Experimental group	Treatment
CONTROL	No product applied
PLACEBO	Moisturizer without REFINED AÇAÍ OIL
REFINED AÇAÍ OIL AT 0.5%	Moisturizer with REFINED AÇAÍ OIL (BR04410B) at 0.5%
REFINED AÇAÍ OIL AT 1.0%	Moisturizer with REFINED AÇAÍ OIL (BR04410B) at 1.0%
REFINED AÇAÍ OIL AT 2.0%	Moisturizer with REFINED AÇAÍ OIL (BR04410B) at 2.0%

All products were stored at room temperature for the duration of the study.

### 3. Procedure

#### 3.1 Corneometry

The measurements were made using a Corneometer® 825 probe coupled to a Multi Probe Adapter MPA-5, which carries the probe. Simultaneously with each measure, an Excel spreadsheet is automatically populated by the coefficient of variation (CV).

#### 3.2 TEWL

Measurements were obtained by Tewameter® 300 coupled to a Multi Probe Adapter MPA-5, which carries the probe. For each area independent measurement was performed.

Both studies consisted of applying the test product on 20 women between 20 and 60 years with dry skin characteristics. The women did not apply any product in the test area (the forearms) for 48 hours prior to the study.

Each volunteer was marked with a surgical pen; five rectangles of 2.5 x 4.0 cm on each forearm. Twenty µL of the samples were applied randomly to the sites, one of the demarcated areas was used as control (without application of any product), another area was used for the placebo (moisturizer without REFINED AÇAÍ OIL), and the other sites were used for the test products (the REFINED AÇAÍ OIL with different concentrations.) The baseline measurements were made, prior to application of test products. After application, the volunteers remained in the laboratory for moisturization measurements after 2, 4, 6 and 8 hours and TEWL measurements 4 and 8 hours after the application. Prior to the first corneometry measurement, any residual product was removed with hydrophilic cotton.

The volunteers remained in the environment with controlled temperature ( $22 \pm 2^{\circ}\text{C}$ ) and relative humidity ( $55 \pm 5\%$ ) throughout the study.

## RESULTS

### 1. Corneometry

The data obtained through analysis of corneometry were performed using Equations 1 and 2 below.

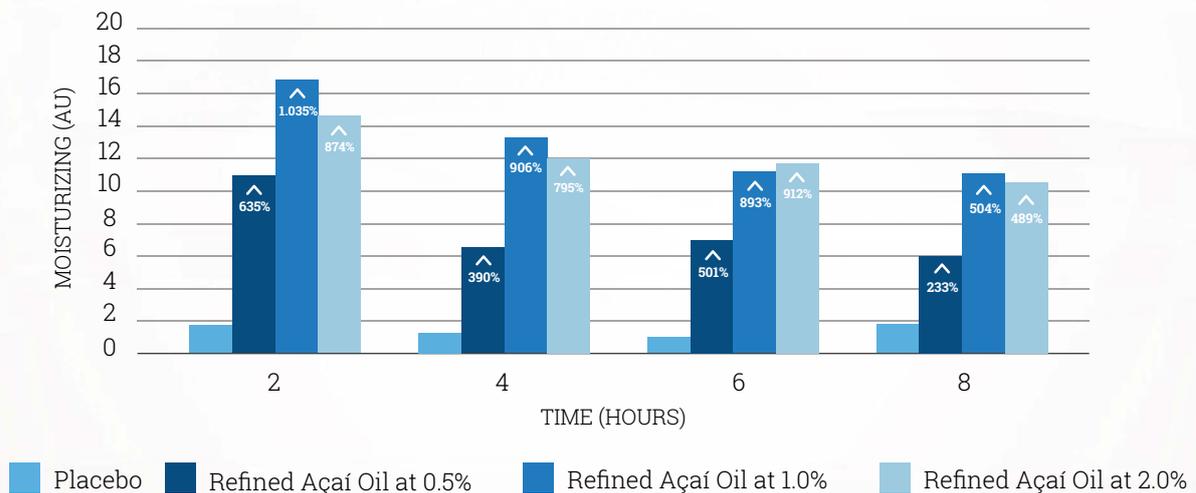
$$\Delta h = h_{ti} - h_{t0}$$

**Equation 1.** Difference in moisturizing between the reading of control and test products over time. Where:  $\Delta h$  = moisturizing difference,  $h_t$  = average of readings over time  $ti$  and  $h_{t0}$  = average of baseline measurements over time  $t0$ .

$$H_{ti} = \Delta h_{ti (product)} - \Delta h_{ti (control)}$$

**Equation 2.** moisturizing calculation,  $H_{ti}$  = moisturizing the skin after  $ti$  application time;  $\Delta h_{ti (control)}$  and  $\Delta h_{ti (product)}$  = difference in moisturizing intensity of control for the products compared to baseline measurements in  $ti$  time, respectively.

The higher the value of  $H_{ti}$ , higher the moisturizing observed by use of the test product relative to **Control** (reference values - not represented in the graph). Thus, the values obtained from equations 1 and 2 can be seen in Chart 1 below.

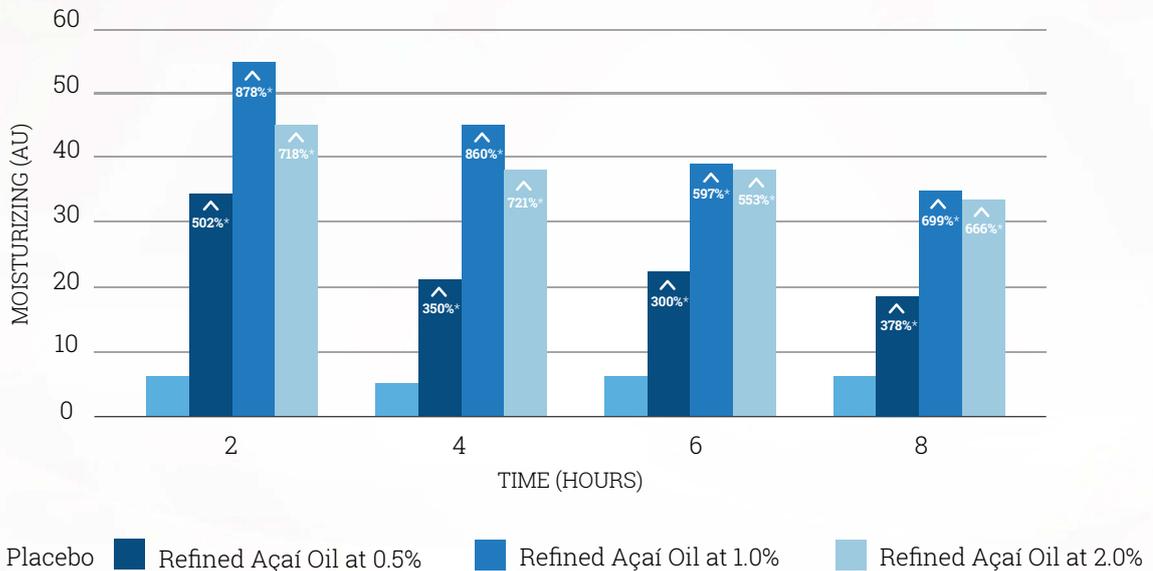


**Chart 1.** Moisturizing conferred by moisturizer samples compared to Control.

Chart 2 shows the percentage of moisturizing of the skin treated with the test product from Equation 3 below.

$$\% \text{ Moisturizing} = 100 (H_{ti}/h_{t0})$$

**Equation 3.** Calculation of % moisturizing over  $ti$  time.  $H_{ti}$  = skin moisturizing after  $ti$  time for application of sample;  $h_{t0}$  = average of baseline measurement in  $t0$  time.



\*Statistical significance  $p < 0.05$  compared to Placebo

**Chart 2.** Percentage of moisturizing (%) conferred by moisturizer samples compared to placebo.

The differences in moisturizing values obtained from samples with REFINED AÇAÍ OIL moisturizer at 0.5%, 1.0%, 2.0% and placebo compared to control, were statistically compared using the Student's t-test method, bimodal, considering a 95% confidence interval.

According to the results, skin moisturizing obtained with moisturizer samples with REFINED AÇAÍ OIL at 0.5%, 1.0% and 2.0% showed a statistically significant difference in 2, 4, 6 and 8 hours after the application when compared to control. This indicates that the formulations with REFINED AÇAÍ OIL are capable of maintaining skin moisturizing for at least 8 hours after application.

The test products were compared by analysis of variance method (ANOVA) with Tukey's post-test, with 95% confidence interval.

According to the results illustrated in charts 1 and 2 and the results of the statistical analysis, you can see that:

- The placebo sample had significant lower hydration when compared to the moisturizers samples with Açai oil at 0.5%, 1.0% and 2.0% in all evaluated times.
- The moisturizer sample with acai oil at 1.0% presented significantly higher hydration when compared to the sample with 0.5% of acai oil after 4, 6 and 8 hours after application. However, after 2 hours of application, there was no significant difference in the degree of hydration between the samples.

- The moisturizer sample with acai oil at 2.0% presented significantly higher hydration when compared to the moisturizer samples with Acai oil at 0.5% after 2, 4, 6 and 8 hours of application. When compared to the sample of Acai oil at 1.0%, no significant difference showed in any of the evaluated times.

## 2. TEWL

To assess the significance of change of hydro-lipidic covering associated with TEWL, the values of  $\Delta e$  (Equation 4) calculated for areas with moisturizer samples with REFINED AÇAÍ OIL were statistically compared with calculated values for Control using the Student's t-test method, bimodal, unpaired, considering a 95% confidence interval for each assessment.

$$\Delta e_{ti} = TEWL_{ti} - TEWL_{t0}$$

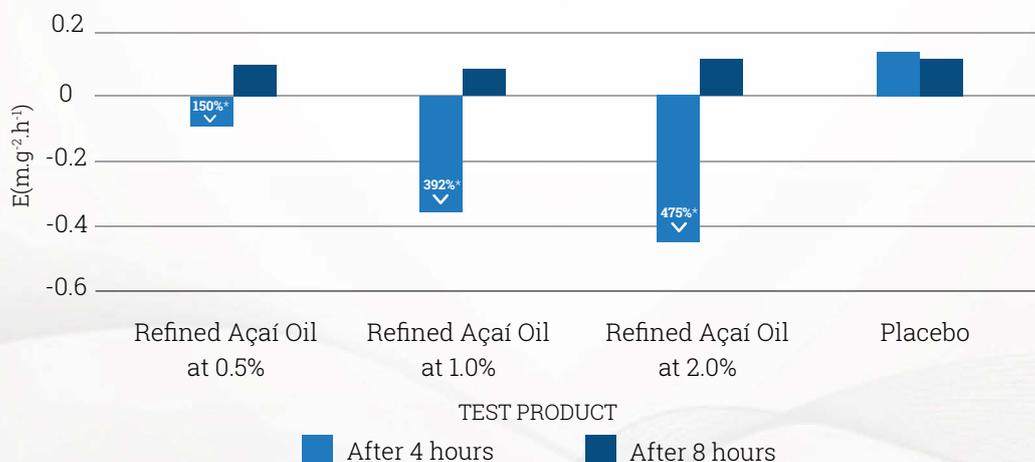
**Equation 4.** Difference in transepidermal water loss. Where:  $\Delta e$  = difference in transepidermal water loss;  $TEWL_{ti}$  = reading averages per area over  $ti$  time and  $TEWL_{t0}$  = average of baseline measurement over time  $t0$ .

According to the calculated values  $\Delta e$ , it is noted that the products test do not show significantly reduced TEWL when compared to control after 4 and 8 hours of application.

For a comparative evaluation, TEWL was calculated on the basis of Control ( $E_{ti}$ ) using Equation 5. Chart 3 shows the results after 4 and 8 hours of application.

$$E_{ti} = \Delta e_{(product, ti)} - \Delta e_{(control, ti)}$$

**Equation 5.** Calculation of transepidermal water loss due to the control, where:  $E_{ti}$  = transepidermal water loss after  $ti$  time of application of moisturizer samples with Açaí oil.  $\Delta e_{(product, ti)}$  e  $\Delta e_{(control, ti)}$  = difference in TEWL for test products and control compared to the baseline measurement in the  $ti$  time, respectively.



\*Statistical significance  $p < 0.05$  compared to Control

**Chart 3.** TEWL for moisturizer samples **with REFINED AÇAÍ OIL at 0.5, 1.0% and 2.0%** and **Placebo** assessed after 4h and 8h of application.

According to the results shown in Chart 3, it was possible to observe a decrease in TEWL after 4 hours of application of the moisturizer samples with REFINED AÇAÍ OIL at 0.5%, 1.0% and 2.0%. It is possible that the TEWL decreased by an occlusion process, or film forming on the skin.

## CONCLUSION

### 1. Corneometry

According to the results, skin moisturizing in moisturizer samples with REFINED AÇAÍ OIL at 0.5%, 1.0% and 2.0% showed a significant difference after 2, 4, 6 and 8 hours of application compared to Control. This indicates that the REFINED AÇAÍ OIL can maintain skin moisturization for at least 8 hours.

### 2. TEWL

According to the results, it was possible to observe that all samples do not alter significantly the level of transepidermal loss of water (TEWL) when compared to the control. However, we can observe a reduction in TEWL promoted by hydrating samples with acai oil at 0.5%, 1.0% and 2.0% after 4 hours of application, being the samples with 1.0% and 2.0% of acai oil more effective. This may indicate that the reduction of transepidermal water loss (TEWL) occurred by film forming on the skin.

## ATTACHMENT

### FORMULATIONS USED IN TESTS

PLACEBO GROUP	
INGREDIENTS	% w/w
<i>Aqua</i>	Up to 100%
<i>Tetrasodium EDTA</i>	0.01
<i>Beracare APS</i>	4.00
<i>Cetearyl Alcohol</i>	4.00
<i>Carbopol 940 (10% sol.)</i>	2.00
<i>Aqua</i>	10.00
<i>Germal 115</i>	0.30

REFINED AÇAÍ OIL GROUP AT 0.5%	
INGREDIENTS	% w/w
Aqua	Up to 100%
Tetrasodium EDTA	0.01
BR04410B – RAIN FOREST 04410 (REFINED AÇAÍ OIL)	0.50
Beracare APS	4.00
Cetearyl Alcohol	4.00
Carbopol 940 (10% sol.)	2.00
Aqua	10.00
Germal 115	0.30

REFINED AÇAÍ OIL AT 1.0%	
INGREDIENTS	% w/w
Aqua	Up to 100%
Tetrasodium EDTA	0.01
BR04410B – RAIN FOREST 04410 (REFINED AÇAÍ OIL)	1.00
Beracare APS	4.00
Cetearyl Alcohol	4.00
Carbopol 940 (10% sol.)	2.00
Aqua	10.00
Germal 115	0.30

REFINED AÇAÍ OIL AT 2.0%	
INGREDIENTS	% w/w
Aqua	Up to 100%
Tetrasodium EDTA	0.01
BR04410B – RAIN FOREST 04410 (REFINED AÇAÍ OIL)	2.00
Beracare APS	4.00
Cetearyl Alcohol	4.00
Carbopol 940 (10% sol.)	2.00
Aqua	10.00
Germal 115	0.30

## APPLICATION

### SUGGESTION OF FORMULATION

<b>Formulation:</b>	FACIAL ANTI-AGING MOISTURIZER
<b>Reference Number:</b>	FAC 056-1215

INGREDIENTS	INCI NAME	% w/w	SUPPLIER
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PHASE A			
WATER	<i>Water</i>	Up to 100%	-
DERMOFEEL PA-3	<i>Sodium Phytate, Aqua, Alcohol</i>	0.10	-
GLYCERIN	<i>Glycerin</i>	2.50	-
OLIVEM 1000	<i>Cetearyl Olivatate and Sorbitan Olivatate</i>	8.00	-
DERMOSOFT 1388	<i>Glycerin, Aqua, Sodium Levulinate, Sodium Anisate</i>	3.50	-

PHASE B			
<b>BR04410B RAIN FOREST 04410 (REFINED AÇAÍ OIL)</b>	<b><i>Euterpe oleracea fruit oil, Tocopherol</i></b>	<b>2.80</b>	<b>BERACA</b>
<b>BAA5110B BERACARE BBA ORGANIC (ORGANIC BIO BEHENIC OIL)</b>	<b><i>Pentaclethra macroloba seed oil, Tocopherol</i></b>	<b>3.20</b>	<b>BERACA</b>

PHASE C			
FRAGRANCE	<i>Fragrance</i>	0.50	-

#### Procedure:

Weigh phase A and heat to 75°C - 80°C.

Weigh phase B and mix.

Add phase B to phase A while stirring.

Add phase C below 35°C.

Sample formulations are provided for your convenience but Beraca Ingredientes Naturais S.A. does not warrant their merchantability, fitness for use, performance, safety, microbiological profile or freedom from patent infringement. They are not commercial formulations and have not been subjected to extensive testing. It is your responsibility to thoroughly test any formulations before use. All warranties, indemnities or liabilities implied or expressed by law are hereby excluded by Beraca Ingredientes Naturais S.A. to the fullest extent permitted by law.

## PHYSICAL AND CHEMICAL PROPERTIES

ANALYSIS	UNITS	SPECIFICATIONS
Appearance	Visual	Viscous liquid, can be translucent or cloudy with characteristic precipitated fraction without changing the properties of the product
Color	Visual	Light yellow greenish to dark yellow
Odor	-	Characteristic
Specific gravity (20°C)	g/cm <sup>3</sup>	0.890 – 0.930
Refractive index (20°C)	-	1.460 – 1.470
Acid value (as oleic acid)	%	≤ 3.0
Peroxide value	meqO <sub>2</sub> /Kg	≤ 10.0
Iodine value	gI <sub>2</sub> /100g	70 – 110
Saponification value	mgKOH/g	180 – 230

## FATTY ACID COMPOSITION

Palmitic acid (C16:0)	%	10.0 – 25.0
Palmitoleic acid (C16:1)	%	≤ 5.0
Stearic acid (C18:0)	%	≤ 5.0
Oleic acid (C18:1)	%	35.0 – 70.0
Linoleic acid (C18:2)	%	5.0 – 25.0

## MICROBIOLOGICAL ANALYSIS

Total bacteria h. m.	cfu/g	< 100
Fungus and yeasts	cfu/g	< 100

## STORAGE INFORMATION

- **Shelf Life** → 12 months
- **Conditions** → Dry, cool, airy place away from light and heat and in an environment with constant temperature not exceeding 25°C
- **Container** → Nitrogen blanketed

## IMPORTANT OBSERVATIONS

- Considering that this is a natural product, if the storage guidelines are not met, the physicochemical characteristics may vary, reducing the shelf life.
- After opening the product it should be used as soon as possible. Contact with oxygen generates an oxidative process reducing the shelf-life of the product.
- Due to the uniqueness of each oil, it is not possible to establish a parameter in relation to oxidative exposure period.
- Natural oil substances and waxes could settle during storage and develop a slight sedimentation at the bottom of the container. Please have this in mind when emptying the container.
- The above information was developed through the methods and practices contained in AOCS (American Oil Chemists' Society).

## REGULATORY INFORMATION

INCI Name (PCPC / COSING)	CAS number
EUTERPE OLERACEA FRUIT OIL	861902-11-6
TOCOPHEROL	59-02-9, 16698-35-4, 54-28-4, 119-13-1



**B** BERACA

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