

BERACA



**RAIN FOREST A3810
(ORGANIC REFINED BURITI OIL)**



BERACA

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: BRA3810B

Related codes: BRA3810BA00, BRA3810BB05, BRA3810BB46, BRA3810BD19, BRA3810BX15, BRA3810BX18, BRA3810BX36, BRA3810BX45

Previous code: RF3860R

The *Mauritia flexuosa* L. f. species belonging to the Arecaceae family, is a plant native to the Amazon, Caatinga and Cerrado regions, popularly known as *Buriti*, *miriti*, *miritizeiro*, *palmeira-do-brejo*, *Buriti-do-brejo*, among others. It is found in flooded lowlands on the banks of rivers and streams, these places are called *miritizais* or *buritizais*.

This palm is propagated by seeds, which lose their germinating power in a few weeks; however, the newly harvested seeds reach 100% germination. The production of Buriti is annual for male trees and in female trees, production occurs every two years at the end of the rainy season. The number of fruits clusters varies from 5 to 7 per plant per year, with about 400 to 500 fruits per cluster. Flowering occurs from April to August, fruiting after 9 months.

The leaves are used as a cover for homes, providing fiber for crafts, used in making mats, nets, ropes, hats, etc. Its pulp is highly appreciated and after fermentation produces buriti wine. It is also used in the preparation of sweets, ice cream, popsicles, juices, etc.

COSMETIC USE

The Buriti oil, extracted from the fruit pulp, is rich in oleic fatty acids and high concentration of carotenoids, especially vitamin A. These characteristics are beneficial for after sun treatment, moisturizing and skin elasticity.

It can be used in sunscreens, creams and lotions for daily use, bath oil, soap, etc. Its fatty acid composition also promotes its application in formulations for sensitive skin and for use in infants and children.

EFFICACY EVALUATION

INTRODUCTION

The skin is the largest organ of the human body. It has three layers, the epidermis, the dermis and subcutaneous tissue and consists of a skin barrier responsible for protecting and coating the skin and to provide sensory functions such as thermoregulation, among other functions.

The stratum corneum is the first layer of the epidermis, being formed by cells called corneocytes, connected by a complex lipid matrix (Figure 1). This layer is approximately 10 to 20% of water, and the percentage of moisturizing depends on the balance between the supply of water to skin and the loss thereof through evaporation. The loss of water 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.

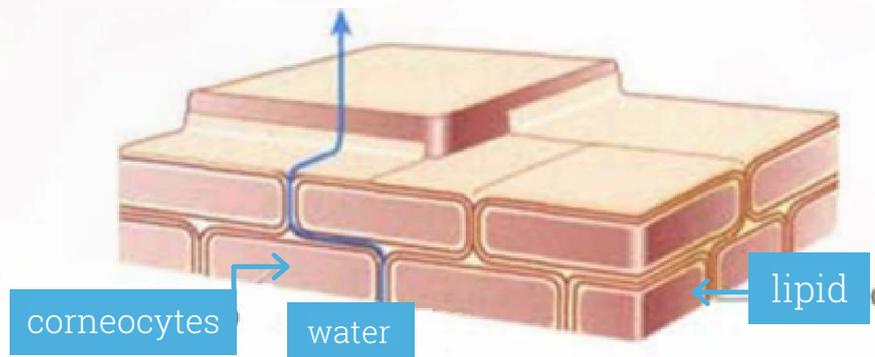


Figure 1. Schematic representation of the stratum corneum, the corneocytes and illustrating the lipid layer between them.

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

The excessive water loss through the skin favors the loss of important characteristics such as firmness and elasticity. The use of cosmetic ingredients for moisturizing benefits can prevent this loss by two mechanisms: forming a barrier against the evaporation surface and / or by moisturizing of the stratum corneum, the main barrier of skin from the water contained in such formulations.

In this context, Beraca has **RAIN FOREST A3810 (ORGANIC REFINED BURITI OIL)**, with proven efficiency in the preservation of skin moisturizing and decrease in transepidermal water loss.

OBJECTIVE

The aim of the study 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 ORGANIC REFINED BURITI OIL at different concentrations in a moisturizer.

METHODS

1. Laboratory

The study was conducted at an 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 2.

Table 2. Products used in the study. protocol BC011-08 - R0.

Experimental group	Treatment
CONTROL	No applied product
PLACEBO	Moisturizer without ORGANIC REFINED BURITI OIL
ORGANIC REFINED BURITI OIL AT 0,5%	Moisturizer with ORGANIC REFINED BURITI OIL (BRA3810B) at 0,5%
ORGANIC REFINED BURITI OIL AT 1,5%	Moisturizer with ORGANIC REFINED BURITI OIL (BRA3810B) at 1,5%
ORGANIC REFINED BURITI OIL AT 3,0%	Moisturizer with ORGANIC REFINED BURITI OIL (BRA3810B) at 3,0%

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 product test on 20 women between 18 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; four rectangles of 2.5 x 4.0 cm on the right forearm and two of the same dimensions on the left forearm. Twenty μ L of the samples were applied randomly to the sites, and one of the demarcated areas was used as control (without application of any product). 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 the measures of TEWL 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.

$$\Delta h = h_{t_i} - h_{t_0}$$

Equation 1. Difference in moisturizing between the reading of control and test products over time. Where: Δh = moisturizing difference, h_t = average of readings over time t_i and h_{t_0} = average of baseline measurements over time t_0 .

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

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

The higher the value of H_{t_i} , 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.

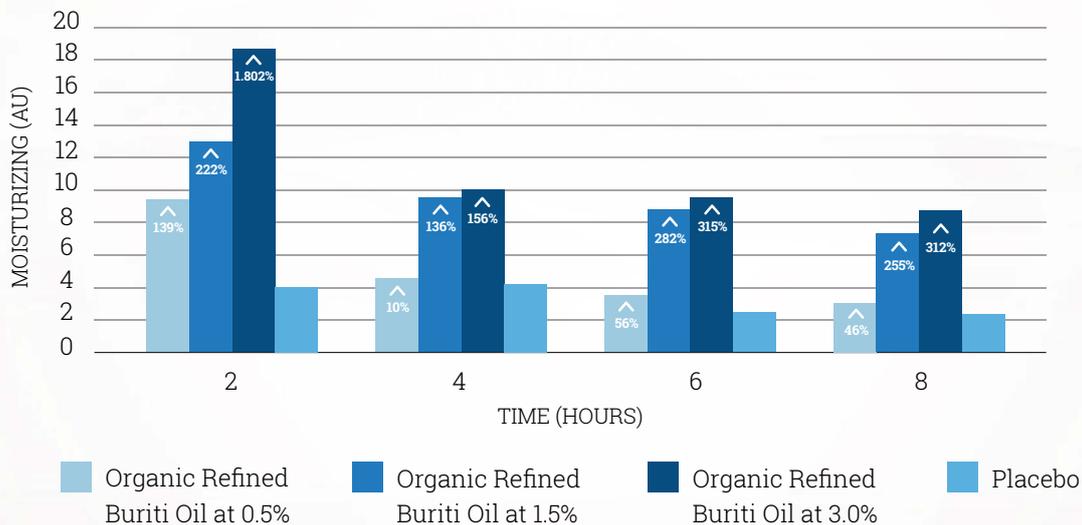


Chart 1. Moisturizing conferred by moisturizer samples with ORGANIC REFINED BURITI OIL at 0.5%, 1.5% and 3.0% compared to placebo.

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

$$\% \text{ Moisturizing} = 100 (H_{t_i}/h_{t_0})$$

Equation 3. Calculation of % moisturizing over t_i time. H_{t_i} = skin moisturizing after t_i time for application of sample; h_{t_0} = average of baseline measurement in t_0 time.

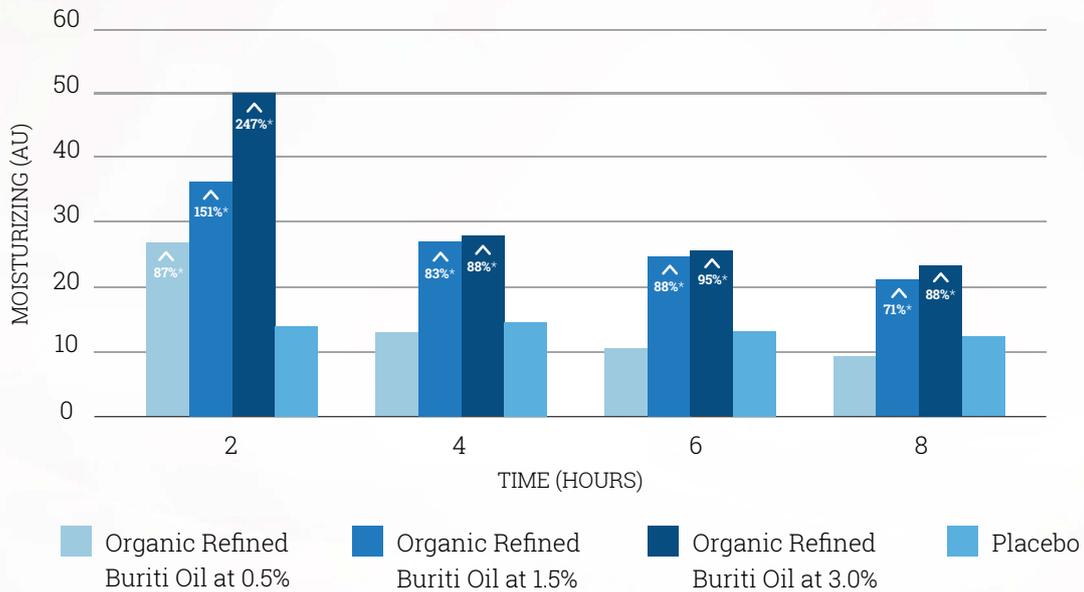


Chart 2. Percentage of moisturizing (%) conferred by moisturizer samples with ORGANIC REFINED BURITI OIL at 0.5%, 1.5% and 3.0% compared to placebo. *Statistical significance $p < 0.05$ compared to Placebo

The differences in moisturizing values obtained from samples with ORGANIC REFINED BURITI OIL moisturizer at 0.5%, 1.5% and 3.0% compared to placebo, were statistically compared using the bimodal, unpaired Student's t-test method, considering a 95% confidence interval.

According to the results, skin moisturizing obtained with moisturizer samples with ORGANIC REFINED BURITI OIL at 0.5%, 1.5% and 3.0% showed a statistically significant difference in 2, 4, 6 hours and 8 hours after the application when compared to control. This indicates that the formulations with ORGANIC REFINED BURITI 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 moisturizer sample with ORGANIC REFINED BURITI OIL at 0.5% had significantly lower hydration compared to the moisturizer samples with ORGANIC REFINED BURITI OIL at 1.5% and 3.0% after 2, 4, 6 hours and 8 hours of application. When compared to placebo, the 0.5% sample had significantly higher moisturizing after 2 hours of application.
- The moisturizer sample with ORGANIC REFINED BURITI OIL at 1.5% presented significantly higher moisturizing compared to moisturizer samples with ORGANIC REFINED BURITI OIL at 0.5% and placebo in all time periods.

- The moisturizer sample with ORGANIC REFINED BURITI OIL at 3.0% presented significantly higher moisturizing compared the moisturizer samples with ORGANIC REFINED BURITI OIL at 0.5% and placebo in all evaluated times. When compared to moisturizer sample with ORGANIC REFINED BURITI OIL at 1.5%, the 3.0% sample presented significantly higher moisturizing after 2 hours of application, however, after 4h, 6h and 8h showed no significant difference.

2. TEWL

To assess the significance of change of hydrolipidic covering associated with TEWL, the values of Δe (equation 4) calculated for areas with moisturizer samples with ORGANIC REFINED BURITI OIL were statistically compared with calculated values for placebo using the bimodal, unpaired Student's t-test method, considering a 95% confidence interval for each assessment.

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

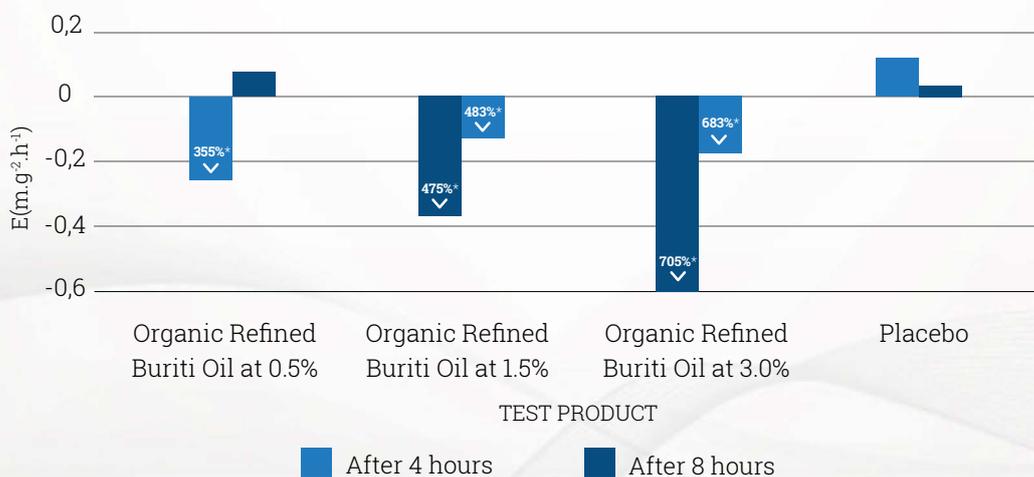
Equation 4. Difference in transepidermal water loss. Where: Δe = difference in transepidermal water loss; $TEWL_{ti}$ = reading averages per area over t_i time and $TEWL_{t0}$ = average of baseline measurement over time t_0 .

According to the calculated values Δe , it is noted that the moisturizing samples with REFINED BURITI OIL significantly reduced TEWL compared to placebo after 4 hours of application. For the evaluation of eight hours, no significant change was detected in TEWL compared to placebo in all areas assessed.

For a comparative evaluation, TEWL was calculated on the basis of Control (E_{ti}) using equation 5. Figure 3 shows the results after 4 hours 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 t_i time of application of moisturizer samples with ORGANIC REFINED BURITI OIL. $\Delta e_{(placebo, ti)}$ e $\Delta e_{(control, ti)}$ = difference in TEWL for test products and control compared to the baseline measurement in the t_i time, respectively.



Graph 3. TEWL for moisturizer samples with ORGANIC REFINED BURITI OIL at 0.5, 1.5% and 3.0% and Placebo assesses after 4h and 8h of application. *Statistical significance $p < 0.05$ compared to Placebo

According to the results shown in Figure 5, we observed a decrease in TEWL up to 8 hours after application of the moisturizer samples with ORGANIC REFINED BURITI OIL 1.5% and 3.0%. For moisturizer sample with ORGANIC REFINED BURITI OIL 0.5% this behavior was observed up to 4 hours after application. 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 ORGANIC REFINED BURITI OIL at 0.5%, 1.5% and 3.0% showed a significant difference after 2, 4, 6 and 8 hours of application compared to Control. This indicates that the ORGANIC REFINED BURITI OIL can maintain skin moisturization for at least 8 hours.

The moisturizer samples with ORGANIC REFINED BURITI OIL at 0.5%, 1.5% and 3.0% significantly increased skin moisturizing up to approximately 50%, 36% and 27%, respectively, compared to control.

The Placebo sample showed significant difference after 2 hours and 4 hours of application compared to control. This indicates that its application maintains moisturizing for a maximum of 4 hours.

The Placebo sample increased skin moisturizing up to 14% compared to the initial moisture level of the skin.

2. TEWL

According to the results, it was possible to observe a decrease in transepidermal water loss (TEWL) up to 8 hours after application of the moisturizer samples with ORGANIC REFINED BURITI OIL at 1.5% and 3.0% and up to 4 hours for sample with ORGANIC REFINED BURITI OIL at 0.5%. This TEWL decrease could be caused 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

ORGANIC REFINED BURITI OIL GROUP AT 0.5%	
INGREDIENTS	% w/w
Aqua	Up to 100%
Tetrasodium EDTA	0.01
<i>BRA3810B – ORGANIC REFINED BURITI OIL</i>	0.50
Beracare APS	4.00
Cetearyl Alcohol	4.00
Carbopol 940 (10% sol.)	2.00
Aqua	10.00
Germal 115	0.30

ORGANIC REFINED BURITI OIL AT 1.5%	
INGREDIENTS	% w/w
Aqua	Up to 100%
Tetrasodium EDTA	0.01
<i>BRA3810B – ORGANIC REFINED BURITI OIL</i>	1.50
Beracare APS	4.00
Cetearyl Alcohol	4.00
Carbopol 940 (10% sol.)	2.00
Aqua	10.00
Germal 115	0.30

ORGANIC REFINED BURITI OIL AT 3.0%	
INGREDIENTS	% w/w
Aqua	Up to 100%
Tetrasodium EDTA	0.01
<i>BRA3810B – ORGANIC REFINED BURITI OIL</i>	3.00
Beracare APS	4.00
Cetearyl Alcohol	4.00
Carbopol 940 (10% sol.)	2.00
Aqua	10.00
Germal 115	0.30

PHYSICAL AND CHEMICAL PROPERTIES

ANALYSIS	UNITS	SPECIFICATIONS
Appearance	Visual	Viscous liquid
Color	Visual	Reddish
Odor	-	Characteristic
Specific gravity (20 C)	g/cm ³	0.800 – 0.980
Acid value (as oleic acid)	%	≤ 2.0
Peroxide value	meqO ₂ /Kg	≤ 10.0
Iodine value	gI ₂ /100g	65 – 95
Saponification value	mgKOH/g	150 – 210

FATTY ACID COMPOSITION

Palmitic acid (C16:0)	%	15.0 – 30.0
Stearic acid (C18:0)	%	≤ 3.0
Oleic acid (C18:1)	%	70.0 – 90.0
Linoleic acid (C18:2)	%	≤ 2.5
Linolenic acid (C18:3)	%	≤ 2.5

MICROBIOLOGICAL ANALYSIS

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

STORAGE INFORMATION

- **Shelf Life** → 14 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 is a natural product, if the storage guidelines are not met, the physicochemical characteristics may vary, reducing shelf life.
- After opening the product should be used as soon as possible. Contact with oxygen generates an oxidative process decreasing the shelf-life of the product.
- Due to the particularity of each oil, it is not possible to establish an oxidative parameter for the period of exposure.
- 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 has been developed with the methods and practices set out in AOCS (American Oil Chemists' Society).

REGULATORY INFORMATION

INCI Name (PCPC / COSING)	CAS number
MAURITIA FLEXUOSA FRUIT OIL	394239-67-9
TOCOPHEROL	59-02-9, 16698-35-4, 54-28-4, 119-13-1



B BERACA

BERACA INGREDIENTES NATURAIS S.A.

Rodovia BR 316, Km 08, Quadra 03, Lote 03
Levilândia - Ananindeua
Pará - Brasil
Phone: +55 (91) 3215-5200