

BERACA



**RAIN FOREST 05010
(REFINED BACURI BUTTER)**



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: BR05010B

Related codes: BR05010BA00, BR05010BX01, BR05010BX03, BR05010BX04, BR05010BX30

Previous code: RF5010

The *Platonia insignis* Mart. species is a fruit tree belonging to the Clusiaceae family ranging from 15 to 25m in height. Originating in Eastern Amazonia, this tree grows naturally in all the states of the North Region and in the states of *Mato Grosso, Maranhão* and *Piauí*. It grows in open areas, clearings, and especially in the secondary vegetation, being rare in dense primary forest. It is one of the most popular fruits of Para state.

The fruits ripen from January to May. They have the same shape of an orange, but vary greatly in size, color, shape and quality of edible pulp. The skin color varies from golden-yellow to yellow-green and have rounded or oval shape.

The fruit is composed of a fleshy endocarp which is semi-solid. If cut, the endocarp will release a yellowish resin which upon drying becomes dark. This endocarp covers one or two seeds which are gray oily solid seeds, covered by a brown, thin and slightly tacky film. The oily seed when dry contains a dark-brown resinous oil and a strong odor.

The pulp, most appreciated part of the fruit is sweet and fine, but sometimes it's sour and acid, highly sought for the manufacture of sweets and juices.

COSMETIC USE

The REFINED BACURI BUTTER acts by promoting the health of mature skin, increasing the energy at the cellular level, nourishing skin and providing a sensation of well-being. The butter is rich in minerals (magnesium, zinc and calcium), and has a significant presence of vitamins D2, E and K, as well as amino acid tryptophan, which, in the presence of light, is responsible for producing serotonin, the neurotransmitter associated with the feeling of well-being.

The use of this ingredient is recommended for various types of cosmetics, including those focused on nutrition and care for mature skin. It can also be applied to hair and scalp products to improve the general physiological condition of the skin and hair.

EFFICACY EVALUATION

INTRODUCTION

The skin, like all organs, ages and suffers from significant physiological changes. The main change is the reduction of cellular energy production. All living organisms require energy to remain metabolically active, and for protection, healing and cell regeneration functions.

By being exposed to many external (UV radiation, pollution) and internal (hormonal and nutritional) influences, the skin requires many repair and protection processes. Thus, a decrease in energy capacity can cause the appearance of aging signs such as wrinkles, spots and dryness.

Structurally, mature skin is more prone to having a reduced epidermal layer. The corneocytes become less frequent and adherent, which destabilizes the skin barrier, promoting greater water loss and less protection against external agents. In addition, the dermis supporting fibers (collagen, elastin and glycosaminoglycans) also undergo changes in renewal rates, which favors the appearance of wrinkles and increased sensitivity.

Also noteworthy is that the cells of the hair follicle (especially present in the scalp) also suffer from metabolic reduction and show a significant reduction of hair diameter, growth and renewal rates.

Thus, cosmetic ingredients that are capable of stimulating production of cell energy in mature skins are of great interest for products which want to prevent skin aging and to promote skin's physiological health.

With this knowledge, Beraca investigated the potential of RAIN FOREST 05010 (REFINED BACURI BUTTER) to stimulate cellular metabolism and to influence structural factors such as skin barrier and hydration for mature skin.

OBJECTIVE

The objectives of the studies were to evaluate the efficacy of the product in stimulating energy metabolism and to analyze the nutritional composition, to evaluate skin hydration and efficacy of skin barrier via corneometry and TEWL, and to evaluate the deep moisturizing of the skin via cutometry in patients undergoing topical treatment with REFINED BACURI BUTTER with 2.0 and 4.0% in moisturizer.

METHODS

1. Laboratory

The studies were conducted by independent laboratories.

1.1 In vitro evaluation of the stimulating efficacy of cellular metabolism

Kosmoscience Ciência & Tecnologia Cosmética Ltda. Study Reference: BC044-16 - R1.

1.2 Analysis of nutritional composition

Mérieux NutriSciences. Study Reference: 190066/2016-0.

1.3 Clinical assessment of skin hydration and the effectiveness of the skin barrier via corneometry and TEWL

Kosmoscience Ciência & Tecnologia Cosmética Ltda. Study Reference: BC046-16-A - R0.

1.4 Clinical Assessment of deep skin hydration via Cutometry

Kosmoscience Ciência & Tecnologia Cosmética Ltda. Study Reference: BC046-16-B - R0.

2.Procedure

2.1 Assessment of the ATP stimulation

2.1.1 Culture of human keratinocytes

Human keratinocytes were seeded into 75 cm² bottles, expanded and grown in an incubator at 37°C in the presence of 5% CO₂, using specific culture medium. Upon reaching confluence, the cells were seeded in 6 well plates for further treatment with investigational product and measurement of ATP production. The cells were treated during 48 hours with dilutions of REFINED BACURI BUTTER at 4,0% adapted of in vitro protocol.

2.1.2 Quantification of ATP

The production of ATP (adenosine triphosphate) was measured using a sandwich ELISA assay, using commercially available kit. The reading of absorbance was performed on Multiskan GO monochromator.

Table 1 presents the experimental groups and their respective treatments for this evaluation.

Table 1. Product used in study protocol 190066/2016-0.

Experimental group	Treatment
REFINED BACURI BUTTER	REFINED BACURI BUTTER (BR05010B)

2.2 Analysis of nutritional composition

The analytical results of nutritional composition were obtained using the following methodological references:

- Metal: ICP-MS – Reference 1569
- Vitamins: AOAC (17th Edition, 2000 - HPLC) – Reference 1674
- Amino acids: report LABTEC 1150289.

2.3 Assessment of skin hydration and the effectiveness of the skin barrier via corneometry and TEWL

To collect the measurements, three 2.5 x 4.0 cm areas were marked on both forearms of the volunteers. After 20 minutes, in environment with temperature (22 ± 2°C) and relative humidity (55 ± 5%) controlled, capacitance and TEWL measurements were collected in the demarcated areas of the skin.

2.3.1 Acquisition of capacitance measurements

The measurements were made using a Corneometer® 825 probe coupled to a Multi Probe Adapter MPA-5, which carries the probe. The hydration promotion by application of products can be observed because of the increase in capacitance value recorded by Corneometer®.

From the capacitance values, you can calculate the variation of skin hydration (DH) and the moisture percentage (% M) using the equations 1 and 2, respectively.

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

Equation 1. Difference in skin hydration for each time evaluated compared to baseline readings. Where: h_t = average of capacitance values obtained after 2, 4, 6 and 8 hours and 15 days; h_{t0} = average of baseline measurements.

$$\%H = 100 \times (h_{ti} - h_{t0}) / h_{t0}$$

Equation 2. Percentage in skin hydration for each time evaluated, where: h_{ti} = average of capacitance values obtained after 2, 4, 6 and 8 hours and 15 days; h_{t0} = average of baseline measurements.

2.3.2 Acquisition of TEWL measurements

Measurements were obtained using Tewameter® 300 coupled to a Multi Probe Adapter MPA-5, which carries the probe. Fortification of the skin barrier promoted by the application of products can be seen because of the decrease in TEWL value recorded by Tewameter®.

From the TEWL values it was calculated the change in TEWL (ΔE) and the percentage of skin barrier fortification (% E) using the equations 3 and 4, respectively.

$$\Delta E = E_{t0} - E_{ti}$$

Equation 3. Difference in skin barrier fortification for each time evaluated compared to baseline. Where: E_{ti} = average of TEWL values after 2, 4, 6 and 8 hours and 15 days; E_{t0} = average of TEWL baseline measurements.

$$\%E_{ti} = 100 \times (E_{t0} - E_{ti}) / E_{t0}$$

Equation 4. Percentage of skin barrier fortification for each estimated time, where: E_{ti} = average of TEWL values after 2, 4, 6 and 8 hours and 15 days; E_{t0} = average of TEWL baseline measurements.

Table 2 presents the experimental groups and their respective treatments for this evaluation.

Table 2. Products used in the study protocols BC046-16-A and BC046-16-B.

Experimental group	Treatment
CONTROL	No applied product
PLACEBO	Moisturizer without REFINED BACURI BUTTER
REFINED BACURI BUTTER at 2,0%	Moisturizer with REFINED BACURI BUTTER (BR05010B) at 2,0%
REFINED BACURI BUTTER at 4,0%	Moisturizer with REFINED BACURI BUTTER (BR05010B) at 4,0%

2.4 Assessment of deep skin hydration via Cutometry

To collect the measurements, three 2.5 x 4.0 cm areas were marked on both forearms of the volunteers. After 20 minutes, in environment with temperature ($22 \pm 2^\circ\text{C}$) and relative humidity ($55 \pm 5\%$) controlled, skin cutometry measurements were collected in demarcated areas. In each area three measurements were taken.

Measurements were taken using the Cutometer MPA 580 equipment, with opening with 2 mm diameter coupled to a Multiple Probe Adapter-MPA 580 that carries the probe for evaluating the deep skin moisturizing in each measurement time (initial and after 15 days).

Deep skin moisturizing was assessed by Uv/Ue (AU) parameter. The UV parameter refers to the movement of interstitial fluid from the network of fibers in the dermis and Ue parameter refers to the stretch of the elastic and collagen fibers. The Uv/Ue parameter of the dermis is the displacement of the interstitial fluid containing highly viscous glycosaminoglycans, by fiber network. The increase in Uv/Ue parameter indicates a decrease in the viscosity of interstitial fluid, as a result of the increasing amount of dermal water. The dermal water accumulation decreases the friction between fibers and facilitates the movement of interstitial fluid in the dermis. Uv/Ue parameter is related to skin hydration in dermal and epidermal levels and indicates an increase in promotion of viscoelasticity and skin moisturizing.

From the values of Uv/Ue parameter, the coefficient of deep skin moisturizing (CH) and the percentage of moisturizing increase (AH%) were calculated using the equations 5 and 6 below.

$$CH_{t_i} = (Uv/Ue)_{t_i} / (Uv/Ue)_{t_0}$$

Equation 5. CH_{t_i} = deep moisturizing coefficient; $(Uv/Ue)_{t_i}$ = ratio of average values of the Uv/Ue parameter for each volunteer; t_0 = initial values; t_i = final values (after 15 days).

$$\%AH_{ti} = 100 \times [(Uv/Ue)_{ti} - (Uv/Ue)_{t0}] / (Uv/Ue)_{t0}$$

Equation 6. %AH_{ti}= deep moisturizing increase percentage; (Uv/Ue)_{ti} = ratio of average values of the Uv/Ue parameter for each volunteer; t0 = initial values; ti = final values (after 15 days).

Table 3 presents the experimental groups and their respective treatments for this evaluation.

Table 3. Product used in study protocol BC044-16.

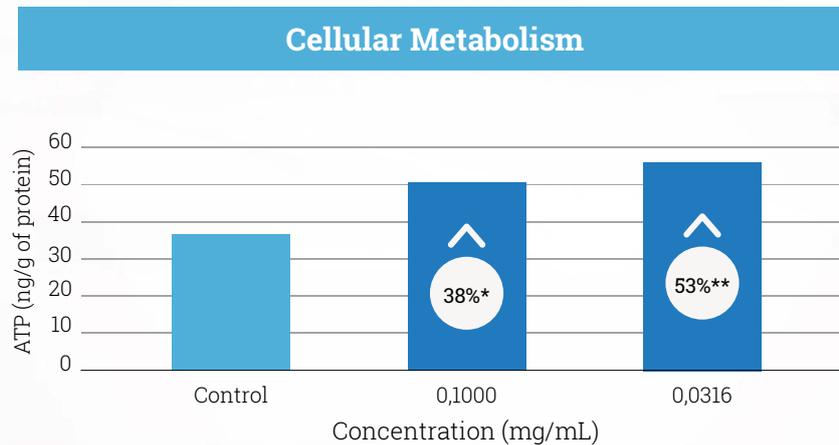
Experimental group	Treatment
REFINED BACURI BUTTER at 4,0%	Moisturizer with REFINED BACURI BUTTER (BR05010B) at 4,0%

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

RESULTS

1. Assessment of the stimulating efficacy of cellular metabolism

The quantification of ATP can be seen in Chart 1 below.



* Statistical significance p<0.05 when compared to control.
 ** Statistical significance p<0.01 when compared to control.

In vitro assessment of cellular energy production (ATP) in cultured human keratinocytes. Cells were treated with dilutions adapted for the in vitro protocol of the REFINED BACURI BUTTER at 4%.

Chart 1.

The results demonstrate that treatment with REFINED BACURI BUTTER at 4.0% is able to stimulate ATP production in cultures of human keratinocytes, at concentrations of 0.100 and 0.0316 mg / ml (p <0.05 and p <0.01, respectively).

2. Analysis of nutritional composition

The quantification of metals, vitamins and amino acids are shown in Tables 4, 5 and 6, respectively.

Table 4. Quantification of metals via ICP-MS.

Metals	Analytical Result	Unit
Calcium	86.7	mg/kg
Magnesium	13.1	mg/kg
Zinc	2.01	mg/kg

Table 5. Quantification of vitamins via HPLC.

Vitamin	Analytical Result	Unit
Vitamin D2	3.70	µg/100g
Vitamin E	1.63	mg/100g
Vitamin K	35.30	µg/100g

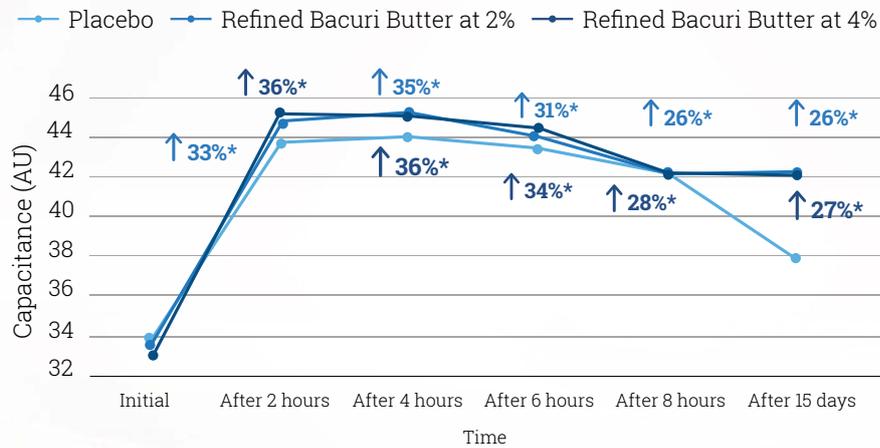
Table 6. Quantification of amino acids as report LABTEC 1150289.

Amino Acid	Analytical Result	Unit
Tryptophan (TRI)	2.9	g/100g

3. Assessment of skin hydration and the effectiveness of the skin barrier via corneometry and TEWL

Charts 2 and 3 show the clinical assessments of skin barrier integrity and loss of transepidermal water TEWL, respectively, in volunteers over 45 years after treatment for 15 days.

Integrity of the Skin Barrier

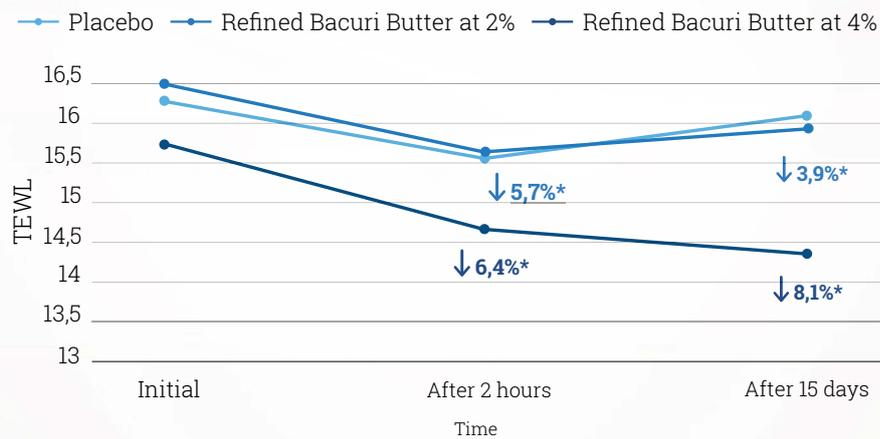


* Statistical significance $p < 0.05$ when compared to control.

Clinical assessment of the integrity of the skin barrier, measured in capacitance, in female volunteers over 45 years of age, who underwent treatment for 15 days.

Chart 2.

Transepidermal Water Loss



* Statistical significance $p < 0.05$ when compared to control.

Clinical assessment of transepidermal water loss through TEWL in volunteers over 45 years of age who underwent treatment for 15 days.

Chart 3.

The initial hydration values of the forearms of the volunteers were compared before the start of the study using the variance analysis method, with Tukey's multiple comparison post-test with 95% confidence interval.

According to results, there was no statistical difference between the initial values on the forearms of the volunteers where the products would be applied. This indicates that initial values are presented homogeneous among themselves.

The comparison between the mean of TEWL values after 2, 4 and 6 hours of application and 15 days of treatment were compared to baseline values, by applying the variance analysis method with Dunnett's multiple comparisons with a 95% confidence interval.

For Placebo product it can be seen that there was a significant increase compared to Control, hydration at all times evaluated. Its application promoted an increase in skin hydration level of 29.4% after 2 hours, 30.7% after 4 hours, 28.6% after 6 hours, 25.5% after 8 hours of application and 12.7% after 15 days of treatment.

The strengthening of skin barrier occurs only at 2 and 4 hours, indicating a significant reduction of loss of transepidermal water, 4.9% and 2.8%, respectively.

The moisturizer containing 2.0% REFINED BACURI BUTTER promoted significant increase, compared to Control, at skin moisture level of 33.9% after 2 hours, 34.8% after 4 hours, 31.2% after 6 hours, 25.9% after 8 hours of application and 23.7% after 15 days of treatment.

Regarding TEWL, the application provided a significant reduction in transepidermal water loss of 5.7% after 2 hours, 3.8% after 4 hours of application and 3.9% after 15 days of treatment.

REFINED BACURI BUTTER applied at 4.0% in moisturizer promoted significant increase, compared to Control, at all evaluated times. Its application increased skin hydration level in 36.3% after 2 hours, 36.3% after 4 hours, 34.7% after 6 hours, 28.7% after 8 hours of application and 27.5% after 15 days of treatment.

There was also a significant reduction in the loss of transepidermal water at all evaluated times. Its application reduced TEWL in 6.4% after 2 hours, 4.1% after 4 hours, 2.1% after 6 hours of application and 8.1% after 15 days of treatment.

For Control areas, there was no significant difference between them, in measurements during evaluated times.

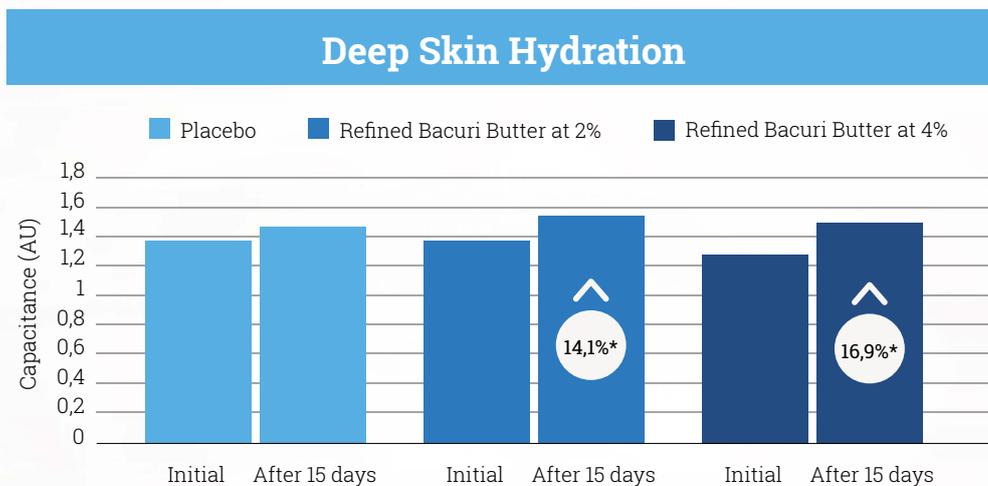
Comparison between investigational products for capacitance and TEWL values, at each time, was made using the variance analysis method with Tukey's multiple comparison post-test with 95% confidence interval.

According to results, in hydration evaluation by corneometry, it was observed that moisturizers containing REFINED BACURI BUTTER at 2.0% and 4.0% promoted a significantly greater skin hydration compared to placebo after 15 days of treatment. Among the moisturizers containing REFINED BACURI BUTTER, there was no significant difference.

Regarding the transepidermal water loss, it can be seen that moisturizers containing REFINED BACURI BUTTER at 2.0% and 4.0% caused strengthening of skin barrier significantly higher compared to placebo after 15 days of treatment. The REFINED BACURI BUTTER applied at 4.0% caused a significant increase in strength when compared to the application at 2.0% after 15 days of treatment.

4. Assessment of deep skin hydration via Cutometry

Chart 3 presents clinical evaluation of deep moisturizing in volunteers over 45 years who underwent treatment for 15 days. The increase was calculated based on the initial value (control) of each of the experimental groups.



* Statistical significance $p < 0.0001$ when compared to control.

Clinical assessment of deep skin hydration in volunteers over 45 years of age who underwent treatment for 15 days. The relative increase was calculated based on the initial values (prior to treatment) of each experimental group.

Chart 4.

The initial hydration values of the forearms of the volunteers were compared before the start of the study using the variance analysis method, with Tukey's multiple comparison post-test with 95% confidence interval.

According to results, there was no statistical difference between the initial values on the forearms of the volunteers where the products would be applied. This indicates that initial values are presented homogeneous among themselves.

Comparison between the average values of Uv/Ue parameter obtained after 15 days of treatment were compared to baseline values, applying Student's paired and bimodal t-test method, considering a 95% confidence interval.

For Placebo product, we observed a significant increase of 5.7% in the deep moisturizing of the skin after 15 days of treatment.

The moisturizer containing REFINED BACURI BUTTER at 2.0% promoted a significant increase of 14.1% in the deep moisturizing of the skin after 15 days of treatment.

The moisturizer containing 4.0% and REFINED BACURI BUTTER caused a significant increase of 16.9% in the deep hydration of the skin after 15 days of treatment.

For the Control area it can be seen that there was no significant difference between the initial values and hydration after 15 days.

According to the results obtained by comparing the investigational product, it is noteworthy that moisturizers containing 2.0% and 4.0% of REFINED BACURI BUTTER promoted an increase in deep moisturizing of the skin significantly greater compared to placebo after 15 days of treatment.

CONCLUSION

The data show that Beraca's REFINED BACURI BUTTER is an ingredient with high nutritional value, which can stimulate the cellular metabolism through increase in energy production (ATP), and improve structural parameters, such as skin barrier function and deep moisturizing on mature skins.

The significant presence of magnesium, calcium and zinc minerals provide essential nutrients to the operation of hundreds of physiological processes, including: enzymatic reactions, muscle contraction, wound healing and immune system functions. Vitamins D2, E and K promote antioxidant and cellular health activities. We also found the presence of amino acid tryptophan in the butter composition, which, when metabolised by the skin, produces biologically active compounds, particularly serotonin, a neurotransmitter associated with a sensation of well being.

Regarding the energizing action, in vitro testing showed REFINED BACURI BUTTER was able to increase ATP production in epidermal cells by up to 50%. At the same time, in clinical evaluation, it was possible to see improvement of the skin barrier integrity and increase in deep moisturizing on average by 15% after 15 days of treatment in volunteers over 45 years old.

Beraca's REFINED BACURI BUTTER is the ideal ingredient for the treatment of mature skins, promoting energy recharge, nutrition and wellness.

ATTACHMENT

FORMULATIONS USED IN TESTS

PLACEBO GROUP	
INGREDIENTS	% w/w
<i>Aqua</i>	Up to 100%
<i>Cetearyl Alcohol</i>	6,00
<i>Ceteareth-20</i>	0,80

REFINED BACURI BUTTER AT 2,0%	
INGREDIENTS	% w/w
<i>Aqua</i>	Up to 100%
<i>Cetearyl Alcohol</i>	6,00
<i>Ceteareth-20</i>	0,80
<i>BR05010B – RAIN FOREST 05010 (REFINED BACURI BUTTER)</i>	2,00

REFINED BACURI BUTTER AT 4,0%	
INGREDIENTS	% w/w
<i>Aqua</i>	Up to 100%
<i>Cetearyl Alcohol</i>	6,00
<i>Ceteareth-20</i>	0,80
<i>BR05010B – RAIN FOREST 05010 (REFINED BACURI BUTTER)</i>	4,00

APPLICATION

SUGGESTION OF FORMULATION

Formulation:	FACIAL NIGHT MOISTURIZER
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INGREDIENTS	INCI name	%	SUPPLIER
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PHASE A			
WATER	<i>Aqua</i>	64.60	-
DERMOFEEL PA-3	<i>Sodium Phytate, Aqua, Alcohol</i>	0.10	-
DERMOSOFT 1388	<i>Glycerin, Aqua, Sodium Levulinate, Sodium Anisate</i>	3.50	-
GLYCERIN	<i>Glycerin</i>	5.00	-

PHASE A1			
ARISTOFLEX VELVET	<i>Polyacrylate Crosspolymer-11</i>	0.80	-

PHASE B			
DERMOFEEL SENSOLV	<i>Isoamyl Laurate</i>	6.00	-
BR05010B RAIN FOREST 05010 (REFINED BACURI BUTTER)	<i>Platonia insignis seed butter, Tocopherol</i>	7.00	BERACA
BA05110B BERACARE BBA (BIO BEHENIC OIL)	<i>Pentaclethra macroloba seed oil, Tocopherol</i>	5.00	BERACA
DERMOFEEL PS	<i>Polyglyceryl-3 Stearate</i>	3.00	-
DERMOFEEL SL	<i>Sodium Stearoyl Lactylate</i>	2.00	-
DERMOFEEL TOCO 70 NON GMO	<i>Tocopherol, Helianthus Annuus (Sunflower) Seed Oil</i>	0.50	-

PHASE C			
TAPIOCA PURE	<i>Tapioca Starch</i>	1.00	-

PHASE D			
FRAGRANCE	<i>Fragrance</i>	0.20	-

PHASE E			
CITRIC ACID (SOL. 20%)	<i>Citric Acid</i>	q.s 5.0 – 5.5	-

Procedure:

Weigh phase (A) and homogenize;
 Heat phase (A) to 75°C - 80°C;
 Add phase (A1) to (A) under stirring;
 Stir phases (A + A1) until a gel is formed;
 Weigh phase (B) and heat to 75°C - 80°C;
 Pour phase (B) in phase (A + A1);
 Homogenize using mechanical stirrer (1.500 rpm);
 Add phase (C) and (D) below 35°C and stir until cooled;
 Adjust the pH between 5.0 to 5.5 using phase (E).

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-CHEMICAL INFORMATION

ANALYSIS	UNITS	SPECIFICATIONS
Appearance	Visual	Solid
Color	Visual	Yellow to beige
Odor	-	Characteristic
Melting Point	°C	53 - 56
Acid Value (as oleic acid)	%	≤ 2.0
Peroxide value	meqO ₂ /Kg	≤ 10.0
Iodine value	gI ₂ /100g	30 - 80
Saponification value	mgKOH/g	170 - 200

FATTY ACID COMPOSITION

Palmitic acid (C16:0)	%	54.0 – 70.0
Palmitoleic acid (C16:1)	%	4.5 – 8.5
Stearic acid (C18:0)	%	≤ 3.0
Oleic acid (C18:1)	%	17.5 – 30.0
Linoleic acid (C18:2)	%	0.5 – 10.0
Linolenic acid (C18:3)	%	≤ 4.0

MICROBIOLOGICAL ANALYSIS

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

STORAGE INFORMATION

- **Shelf-Life** → 18 months
- **Conditions** → Dry, cool, airy place away from light and heat and in an environment with constant temperature not exceeding 25°C

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 decreasing the shelf-life of the product.
- Due to the uniqueness of each butter, 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)	CAS Number
PLATONIA INSIGNIS SEED BUTTER	1943723-34-9
TOCOPHEROL	59-02-9, 16698-35-4, 54-28-4, 119-13-1



BERACA

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