BERACA

RAIN FOREST 05710 (REFINED PATAUÁ OIL)

RAIN FOREST SPECIALTIES BRASIL

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.

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GENERAL INFORMATION

Product Code: BR05710B
Related codes: BR05710BA00, BR05710BB46, BR05710BD19, BR05710BX15, BR05710BX18, BR05710BX36, BR05710BX45
Previous code: RF5710

The *Oenocarpus bataua* species belongs to the family Arecaceae and is a plant native to South America, especially in the basins of the Amazon and *Orenoco Rivers*. The species, popularly known as *Patauá*, *Patoá* and *Patuá*, has many uses and occurs all over Amazon. In cooking, the patauá oil is mainly used in salads and fried foods because it is highly unsaturated and rich in aminoacids. The fruits are also often eaten raw in nature.

Patauá is easily recognized for it is a lone palm tree, defenseless, standing up to 25 m tall and about 30 cm in diameter. Having 8 to 16 leaves arranged in a spiral shape, each one measuring 6 to 8 m in length. The fruits have a round-oval shape, are dark purple when ripe, and are covered by a white waxy layer. The mesocarp is succulent and oily, white, green or pinkish purple in color. The single seed contains a ruminated endosperm covered with delicate flattened fibers and corneum endosperm. Seed germination occurs in the period between 40 and 88 days. The germination, growth and development of patauá plantlets can occur in shady conditions, needing light only in the reproductive phase.

COSMETIC USE

Due to its composition rich in essential fatty acids such as linolenic, linoleic and oleic, both the fruit and the oil extracted from the patauá pulp have revitalizing properties and are generally indicated for cosmetic applications such as shampoos, conditioners, hair masks, and skin moisturizers, as well as products for chemically damaged hair and scalp, as tested by Beraca.

EFFICACY EVALUATION

INTRODUCTION

Hair care is a constant concern for men and women, as it identifies the style of a person, health, status, and level of personal care and self-esteem as well as individual aspirations of elegance, freedom and other aspects.

In addition to the care of hair itself, there is now a concern with the scalp, since any abnormality ends up reflecting directly on the hair, causing it to grow dry and undisciplined, with damage to its fiber, possibly leading to lead to hair loss. In more severe cases, it can compromise the hair growth.

Products such as hair dyes, bleaches, relaxers and straighteners can irritate the scalp due to aggressive substances, included in these products. This irritation can cause problems ranging from flaking of the scalp to erythema accumulation, itching or blisters.

The scalp is the new focus of the cosmetic industry. For this reason, many cosmetic products specifically oriented for the scalp have been launched. There are now a variety of products in this segment, such as products to control oiliness and dandruff, reduce hair loss, promote deeper cleaning and even moisturize and protect against sunlight.

Scalp care products have specific characteristics that can be evaluated by means of sensory analysis, a method to evaluate the acceptance of the products in the market by measuring tastes and preferences of consumers. Based on the results, it is possible to measure, evaluate and interpret the sensory perception of the product under review.

OBJECTIVE

The studies aim to assess, via Scanning Electron Microscopy (SEM), the level of damage in the hair fiber surface after treatment with formulations containing REFINED PATAUÁ OIL, and also to determine the effectiveness on the scalp, specifically the reduction of flaking and improvements to the texture and moisturziation of the stratum corneum.

METHODS

1. Laboratory

The studies were performed in independent laboratory, the *Kosmoscience Ciência & Tecnologia Cosmética Ltda*.

1.1. Evaluation of the reduction of damage by SEM

Study reference: BC036-13 - R0.

1.2. Sensorial evaluation of improvement in the appearance of the scalp

Study reference: BC040-13 - R0.

2. Experimental groups and treatments

For the assessments of "Evaluation of the reduction of damage by SEM" and of "Sensorial evaluation of improvement in the appearance of the scalp" the experimental groups and their respective treatments are listed in the following Tables 1 and 2.

Table 1. Products used for Evaluation of the reduction of damage by SEM.

Experimental Group	Treatment Group
CONTROL	20% SLES solution
REFINED PATAUÁ OIL	REFINED PATAUÁ OIL (BR05710B)

Table 2. Products used for Sensorial evaluation of improvement in the appearance of the scalp.

Experimental Group	Treatment Group
CONTROL	Control Shampoo
PLACEBO	Placebo
REFINED PATAUÁ OIL	REFINED PATAUÁ OIL (BR05710B)

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

3. Realization Procedure

3.1. Evaluation of the reduction of damage by SEM

Nine tresses of hair were prepared from Caucasian hair, each weighing 5.0 g and measuring 25 cm in length. All tresses of hair were submitted to a standard pre-cleaning process with a 10% SLES solution for 1 minute, and rinsed with running water. The hair tresses were dried for 24 hours at room temperature (20 ± 2°C) and controlled relative humidity (50 ± 5%).

3.1.1. Treatment of hair tresses with the Control Group

a) The water temperature used for washing was between 35-40 °C;

b) The tresses of hair were wet for 20s and then the excess water was removed;

c) 1.0 mL of 20% SLES solution was applied to each hair tresses and massaged for 60 seconds. The tresses of hair were rinsed for 30 s and the excess of water removed.

3.1.2. Treatment of hair tresses with the REFINED PATAUÁ OIL Group

a) The water temperature used for washing was between 35-40 °C;

b) The tresses of hair were wet for 20s and then the excess water was removed;

c) 1.0 mL of **Conditioner with** REFINED PATAUÁ OIL was applied to each hair tresses and massaged for 60 seconds. After 2 minutes, the tresses of hair were rinsed for 30 s and the excess of water removed.

3.1.3. Scanning Electron Microscopy

From the central area, a 5 mm segment of hair was taken for analysis and attached to the support of the microscope using a carbon based conductive adhesive tape.

For each test, 5 photomicrographs were obtained randomly using the Scanning Electron Microscope ZEISS® 940-A.

For values quantitation, the Scion® software was used for image analysis. Thus, the quantitation of the clearest areas was given by the percentage of white pixels in the image, after standardization of the parameters of brightness, contrast and intensity. These clearest areas correspond to the increase of the surface, either by lifting the edges of cuticles as fragmentation.

3.2. Sensorial evaluation of improvement in the appearance of the scalp

Forty-five volunteers, which have chemical treatments between 1 and 3 days before the start of the test, were randomly selected for this study and were instructed not to wash their hair at least 48 hours before the study and do not apply any product on the hair or the scalp.

On the first day, after performing pictures of the scalp, the volunteers received instructions about the product application, and that would return to the laboratory 7 and 21 days after the start of the test.

After each analysis, they answered questionnaires with scores from 1 to 5 on the results they perceived. For tests of scalp moisture and texture, the scores scale obeyed the criteria: 1-very bad, 2-bad, 3-indifferent, 4-good, 5-very good. In order to reduce flaking, the criteria were: 1-none; 2-bit, 3-moderate, 4-intense and 5-severe.

RESULTS

1. Evaluation of the reduction of damage by SEM

From the obtained photomicrographs, the quantification of the level of damage on the surface of the hair fiber, "Percentage of damage, D", was obtained, representing the percentage of white pixels related to the total pixel number converted into a binary image (black and white), as shown in Figure 1.

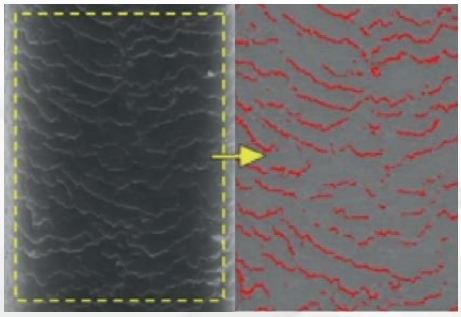
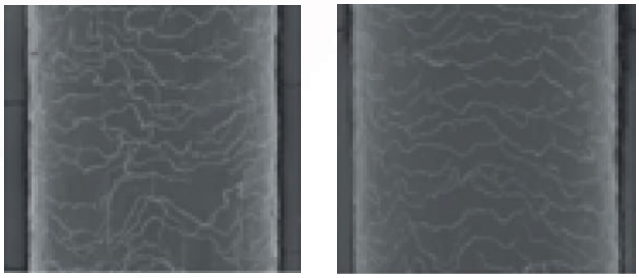


Figure 1. Illustration of the fragments and edges detection by image analysis.

The following Figure 2 shows the micrographs obtained for the treatment group (**Conditioner with REFINED PATAUÁ OIL**).

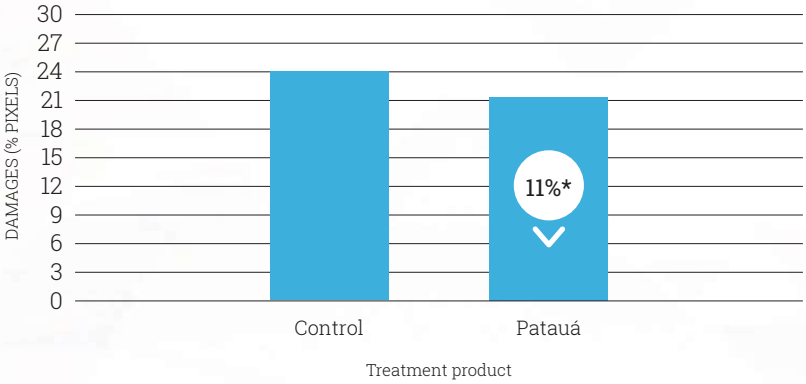


Control

Conditioner with
REFINED PATAUÁ OIL

Figure 2. Photomicrographs obtained from hair fiber subjected to the treatment group

The following Graph 1 shows the results obtained, in percentage of damage, in each sample from the image analysis.



*Statistical significance p<0.0.5 compared to Control

Graph 1. Results of the percentage of damage detected on the surface of the hair fiber by image analysis through SEM.

The obtained results were statistically compared with each other, using the method of one-factor analysis of variance (ANOVA), with post-test of Dennett's multiple comparison, considering a 95% confidence interval.

According to the obtained results, the hair tresses subjected to treatment with the **Conditioner with REFINED PATAUÁ OIL** showed a significant decrease in the amount of damage to the fiber surface as compared to the **Control**.

Using equations 1 and 2, it is possible to calculate the "Damage Reduction, RD" in percentage and in number of times of the treatment group compared to **Control**. The Table 3 shows the values obtained.

$$RD(\%) = 100 * \left(\frac{DC_{CTRL} - DC_{TRT}}{DC_{CTRL}} \right)$$

Equation 1. Damage Reduction, RD (%), of treatment group (**Conditioner with REFINED PATAUÁ OIL**) compared to **Control**.

$$RD = \left(\frac{DC_{CTRL}}{DC_{TRT}} \right)$$

Equation 2. Damage Reduction, RD (number of times) of treatment group(**Conditioner with REFINED PATAUÁ OIL**) compared to **Control**.

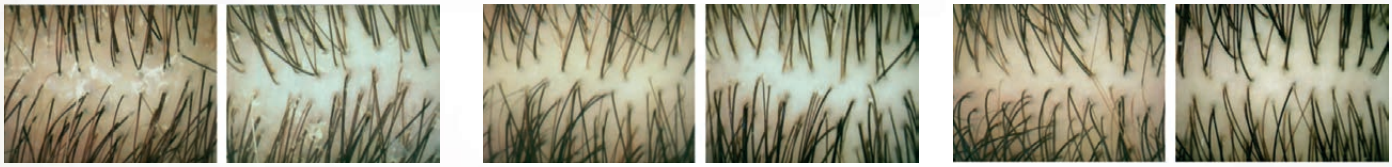
Table 3. Damage Reduction, RD, of treatment group (**Conditioner with REFINED PATAUÁ OIL**), in percentage and number of times, compared to **Control**.

Product	%	Number of times
Conditioner with REFINED PATAUÁ OIL	11	1.1

2. Sensorial evaluation of improvement in the appearance of the scalp

2.1. Treatment with the REFINED PATAUÁ OIL Group

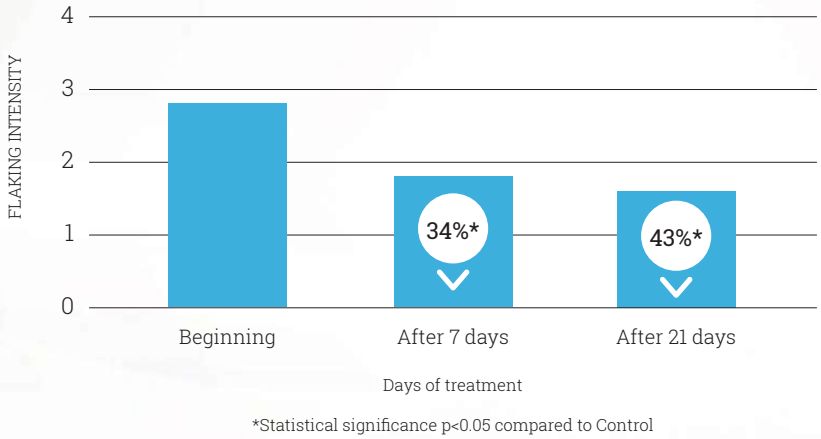
The Photomicrographs of the following Figure 3 show the results in two randomly selected individuals, who were submitted to the treatment with the conditioner and gel containing REFINED PATAUÁ OIL group.



Beginning | After 7 days of treatment | After 21 days of treatment

Figure 3. Photomicrographs of the results obtained at the beginning of treatment and after 7 and 21 days of continuous use in the Treatment with the **REFINED PATAUÁ OIL Group**.

The Graph 2 shows the average of flaking intensity evaluation results of the scalp obtained from the study after 7 and 21 days of beginning of the treatment with the **REFINED PATAUÁ OIL Group**.

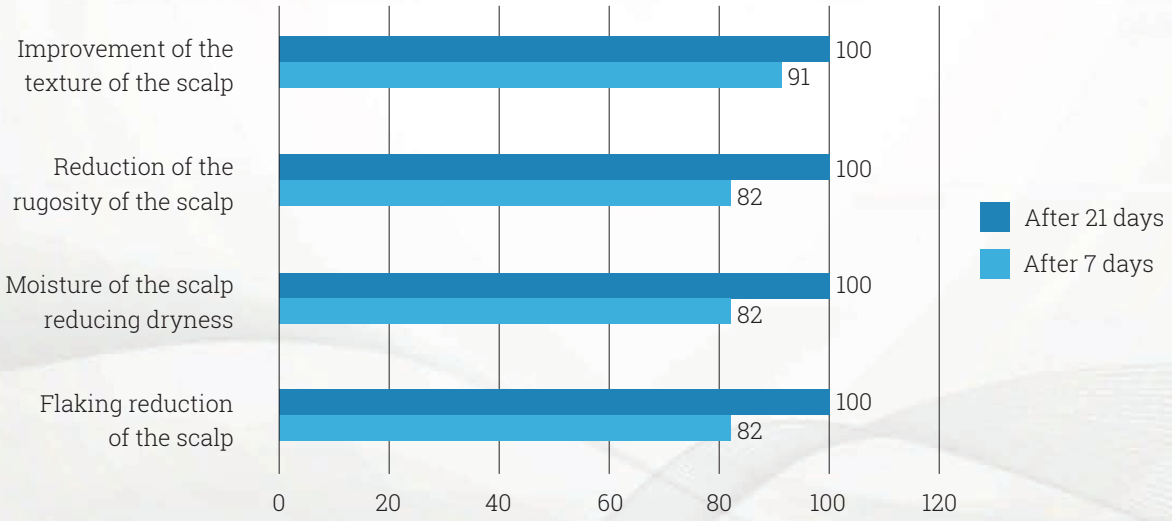


Graph 2. Average of flaking evaluation intensity results of the scalp to the treatment with the **REFINED PATAUÁ OIL Group**.

The values obtained between 7 and 21 days after the beginning of the treatment were compared using the method of Wilcoxon classification, parametric, unpaired, considering a 95% confidence interval.

According to the results presented in Graph 2 and the results of the statistical analysis, we observed an average reduction of 34% and 43% after 7 and 21 days, respectively.

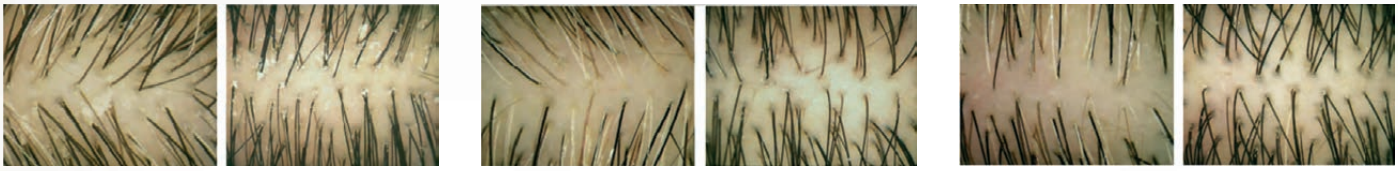
The following Graph 3 shows the percentage of volunteers who have realized the effectiveness of the product after 7 and 21 days of the treatment with the **REFINED PATAUÁ OIL Group**.



Graph 3. Results of sensorial evaluation by perception of effectiveness after 7 and 21 days of Treatment with the **REFINED PATAUÁ OIL Group**.

2.2. Treatment with the Placebo group

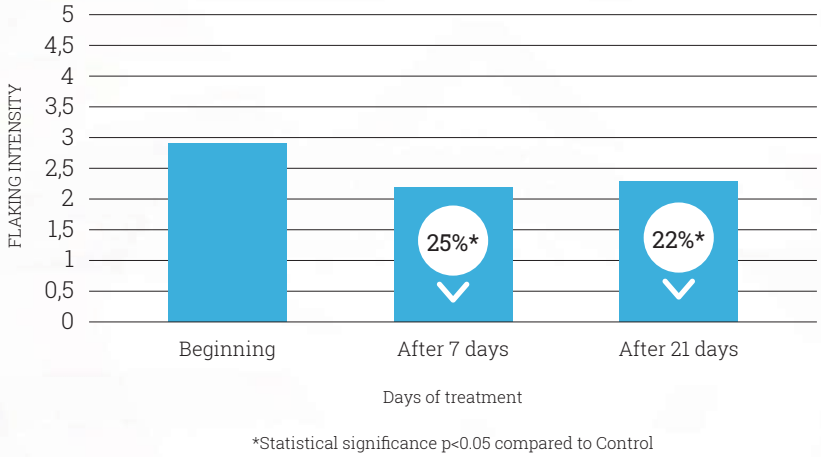
The Photomicrographs of the following Figure 3 show the results in two randomly selected individuals, who were submitted to the treatment with conditioner and gel placebo.



Beginning | After 7 days of treatment | After 21 days of treatment

Figure 4. Photomicrographs of the results obtained at the beginning of treatment and after 7 and 21 days of continuous use in the Treatment with the **Placebo Group**.

The Graph 4 shows the average of flaking intensity evaluation results of the scalp obtained from the study after 7 and 21 days of beginning of the treatment with the **Placebo Group**.

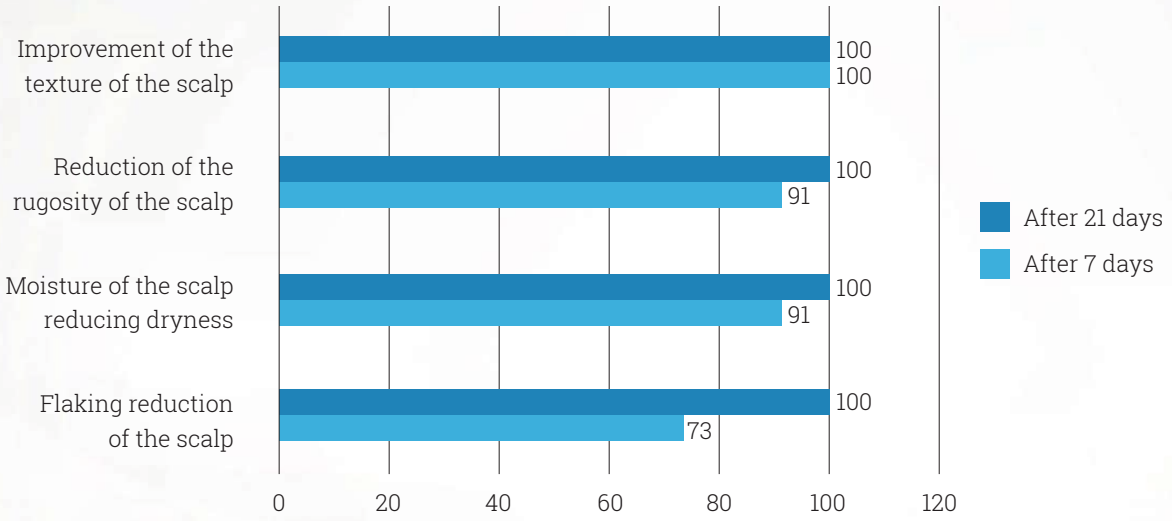


Graph 4. Average of flaking intensity evaluation results of the scalp to the treatment with the **Placebo Group**.

The values obtained between 7 and 21 days after the beginning of the treatment were compared using the method of Wilcoxon classification, parametric, unpaired, considering a 95% confidence interval.

According to the results presented in Graph 4 and the results of the statistical analysis, we observed an average reduction of 25% and 22% after 7 and 21 days, respectively.

The following Graph 5 shows the percentage of volunteers who have realized the effectiveness of the product after 7 and 21 days of the treatment with the **Placebo Group**.



Graph 5. Results of sensorial evaluation by perception of effectiveness after 7 and 21 days of Treatment with the **Placebo Group**.

CONCLUSION

1. Evaluation of the reduction of damage by SEM

The damages, determined via SEM with image analysis indicated improvement in the surface of the cuticle, with cuticles edge flat and removal of fragments.

In this study, the Caucasian tresses of hair after being subjected to treatment with **Conditioner with REFINED PATAUÁ OIL** showed 11% (1.1-times) reduction in surface damage when compared with the tresses of hair subjected to treatment with only 20% (**Control**).

2. Sensorial evaluation of improvement in the appearance of the scalp

According to the obtained results, it was possible to observe than:

2.1. Sensorial evaluation by perception of effectiveness

2.2.1. Treatment with the REFINED PATAUÁ OIL Group

After 7 days:

- 80% of the volunteers said that the treatment reduced the flaking of the scalp.
- 80% of the volunteers said that the treatment promoted moisture of the scalp, reducing dryness.
- 80% of the volunteers said that the treatment reduced the rugosity of the scalp.
- 90% of the volunteers said that the treatment improved a texture of the scalp.

After 21 days:

- 100% of volunteers said that the treatment reduced the flaking of the scalp.
- 100% of the volunteers said that the treatment promoted moisture of the scalp, reducing dryness.
- 100% of volunteers said that the treatment reduced the rugosity of the scalp.
- 100% of the volunteers said that the treatment improved a texture of the scalp.

2.2.2. Treatment with the Placebo Group

After 7 days:

- 80% of the volunteers said that the treatment reduced the flaking of the scalp.
- 90% of the volunteers said that the treatment promoted moisture of the scalp, reducing dryness.
- 90% of the volunteers said that the treatment reduced the rugosity of the scalp.
- 100% of the volunteers said that the treatment improved a texture of the scalp.

After 21 days:

- 100% of the volunteers said that the treatment reduced the flaking of the scalp.
- 100% of the volunteers said that the treatment promoted moisture of the scalp, reducing dryness.
- 100% of the volunteers said that the treatment reduced the rugosity of the scalp.
- 100% of the volunteers said that the treatment improved a texture of the scalp.

2.2. Reduction of the flaking of the scalp via image analysis

The flaking intensity of the scalp was significantly reduced after 7 and 21 days after the beginning of the treatment with the **REFINED PATAUÁ OIL** and **Placebo** Groups.

The **Placebo Group** presented reduction of 25% in 7 days and of 22% in 21 days. The **REFINED PATAUÁ OIL Group** presented flaking reduction of the scalp of 37% and 42% in 7 and 21 days, respectively.

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APPLICATION

SUGGESTION OF FORMULATION

1. Scalp recovery treatment

Formulation:	**SCALP RECOVERY TREATMENT**

INGREDIENTS	INCI	%	SUPPLIER
PHASE A			
WATER	*Aqua*	87.35	-
DERMOFEEL PA-3	*Sodium Phytate, Aqua, Alcoohol*	0.10	-
VERSTATIL PC	*Phenoxyethanol, Caprylyl Glycol*	1.00	-
PHASE A1			
ARISTOFLEX AVC	*Ammonium Acryloyldimethyltaurate/VP Copolymer*	1.55	-
PHASE B			
BR05710B RAIN FOREST 05710 (REFINED PATAUÁ OIL)	***Oenocarpus bataua fruit oil, tocopherol***	**2.50**	**BERACA**
DERMOFEEL SENSOLV	*Isoamyl Laurate*	5.00	-
DERMOFEEL PS	*Polyglyceryl-3 Stearate*	2.00	-
PHASE C			
FRAGRANCE	*Fragrance*	0.50	-

Procedure:

Weigh all ingredients of phase A and heat until 75°C - 80°C stirring complete homogenization.

Pulverize phase A1 in phase A. Wait 5 minutes to hydrate the polymer.

Lead to heating without homogenization of Aristoflex AVC. Upon reaching 75°C - 80°C stir to form the gel.

Weight all ingredients of phase B and heat until 75°C - 80°C.

Add phase B in A stirring until room temperature.

Add phase C below 35°C.

If necessary, adjust the pH-value 5.0 - 6.0.

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PHYSICAL-CHEMICAL INFORMATION

ANALYSIS	UNITS	SPECIFICATIONS
Appearance	Visual	Viscous liquid
Color	Visual	Colorless to light green
Odor	-	Characteristic
Acid value (as oleic acid)	%	≤ 2.0
Peroxide value	$meqO_2/Kg$	≤ 10.0
Iodine value	$gI_2/100g$	65 – 86
Saponification value	mgKOH/g	180 – 210

FATTY ACID COMPOSITION

Palmitic acid	(C16:0)	10.0 – 18.0%
Stearic acid	(C18:0)	2.5 – 4.5%
Oleic acid	(C18:1)	65.0 – 85.0%
Linoleic acid	(C18:2)	2.0 – 7.0%

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
- **Container** → Nitrogen blanketed

IMPORTANT OBSERVATIONS

- Considering that is a natural product, if the storage guidelines are not met, the physicochemical characteristics may vary, reducing their shelf life.
- After opening the product to be consumed 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
OENOCARPUS BATAUA FRUIT OIL	1938910-14-5
TOCOPHEROL	59-02-9, 16698-35-4, 54-28-4, 119-13-1

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