BERACA

BERACARE BBA

Organic Bio Behenic Oil

BERACARE BBA
BIO BEHENIC
ACTIVE SYSTEM

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: BA05110B

Related codes: BA05110BA00, BA05110BB46, BA05110BD19, BA05110BX15, BA05110BX18, BA05110BX36, BA05110BX45, BR05110BB05, BR05110BX05

Previous code: RF5110

The Pracaxi tree (*Pentaclethra macroloba*) can reach 40m tall and 1.5m in diameter, with a smooth bark gray to brown, being part of the family *Fabaceae*. It is widely distributed in the lowland Neotropical and occurs in South America, northeast of Venezuela until the Guianas, including Trinidad and Tobago and the Amazon, however little known in Brazil in terms of usage and popular knowledge.

The leaves are similar to feathers, because they measure about 30cm and are bipartite. The flowers are small and numerous and measure 15 to 20cm long in relatively dense branches.

An interesting finding is that in a branch, there are more than 200 flowers, but only 1-5 fruits develop. There are fruit pods, where it is produced 3-8 seeds per pod.

During the summer it starts flowering, due to the large amount of rainfall in the Amazon region.

COSMETIC USE

Beracare BBA has whitening activity, a result of the reduction of melanin synthesis, and anti-aging benefits, since it stimulates the production of hyaluronic acid, natural polysaccharide present in human skin with high water retention capacity, giving elasticity and skin integrity. In addition, the active allows the density increase of the network of collagen fibers of the dermis. In this way, the ingredient has a firming effect, promoting deep hydration and the sensation of softness of the skin.

We indicate the use of this raw material for the manufacture of various types of cosmetics aimed at skin care, and can also be applied to hair products aimed at improving the combability, increasing the brightness and reducing frizz besides being a natural conditioning agent.

EFFICACY EVALUATION - HAIR CARE

INTRODUCTION

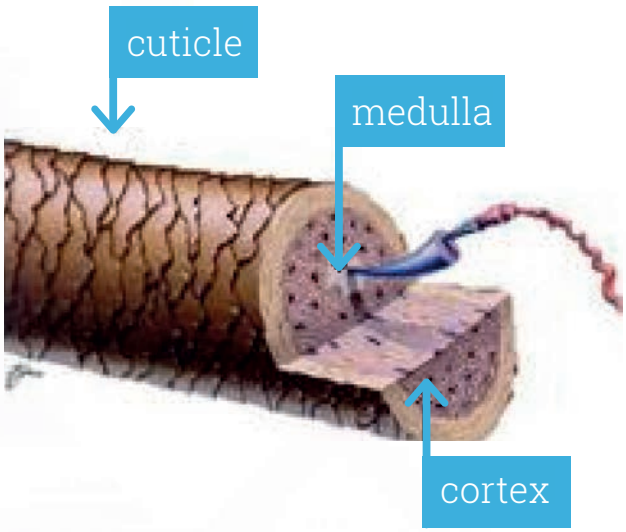
Hair is a natural fiber formed by keratin. According to its geometry and physical structure, the hair has various properties, such as elasticity, softness, volume, combability and shine.

Based on its morphology, the hair has three layers:

- Cuticle: outermost layer, contains a high level of cysteine. Acts as protector of the innermost layer, the cortex.

- Cortex: Part of the hair with the greatest mass. Formed by very fine fibers, it has melanin granules which determine the color and photoprotection of hair according to the quantity. Straightening / permanent wave and color processes occur in this hair region.
- Medulla: central fiber, it may be discontinuous or absent in certain types of hair.

Figure 1 below shows a scheme of the hair fiber.



(SOURCE: Fitocosmetic)

Figure 1. Schematic representation of the hair fiber.

Beracare BBA comes from pracaxi oil, which has a high concentration of behenic acid, a saturated fatty acid with 22 linear chain carbons, with amphiphilic characteristics, being able to promote emollience, lipid replacement and restructuring the capillary fiber an excellent giver of shine and softness to the hair.

In this sense, Beraca investigated the potential of Beracare BBA for action as a hair conditioner.

OBJECTIVE

The aim of this study was to analyse the Beracare BBA conditioning activity compared to a placebo and equivalence of efficacy when compared to a cationic agent, both in "salon test".

METHODS

1. Laboratory

The studies were carried out in an independent laboratory, *Allergisa Pesquisa e Dermato-Cosmética Ltd*a. Reference of the studies: 07-10278-11/12 and 07-10278-11/14.

2. Experimental groups and treatments

The experimental groups and their respective treatments are listed in table 1.

Table 1. Products used in study protocols 07-10278-11/12 e 07-10278-11/14;

Experimental Group	Treatment
PLACEBO	Conditioner without active
CATIONIC AGENT	Conditioner with cationic agent at 3.0%
BERACARE BBA	Conditioner with Beracare BBA at 3.0%

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

3. Methodology

The conditioning activity and the efficacy equivalence of the Beracare BBA active were evaluated through the "salon test". Both evaluations were made through the descriptive sensory analysis applied to 30 female volunteers, in an age group of 19 to 64 years who, after washing with standard shampoo, had the conditioners applied randomly in each half-head in a single simple wash.

The attributes were evaluated by trained technicians who performed a Quantitative Descriptive Analysis using a scale of 1 to 7 points, where 7 means the highest performance.

To evaluate the conditioning activity, **Placebo** and **Beracare BBA** products were used, and the attributes of penteability and softness (wet) were evaluated. The results were compared statistically through Student's t test, with 95% confidence interval.

For the equivalence test of effectiveness, the products **Cationic Agent** and **Beracare BBA** were used, and the scattering, rinsing and gloss attributes were evaluated.

For the evaluation of equivalence of efficacy, the products **Cationic Agent** and **Beracare BBA** were qualitatively compared according to the results of protocols 07-10278-11/12 and 07-10278-11/14.

3.1 Washing Procedure

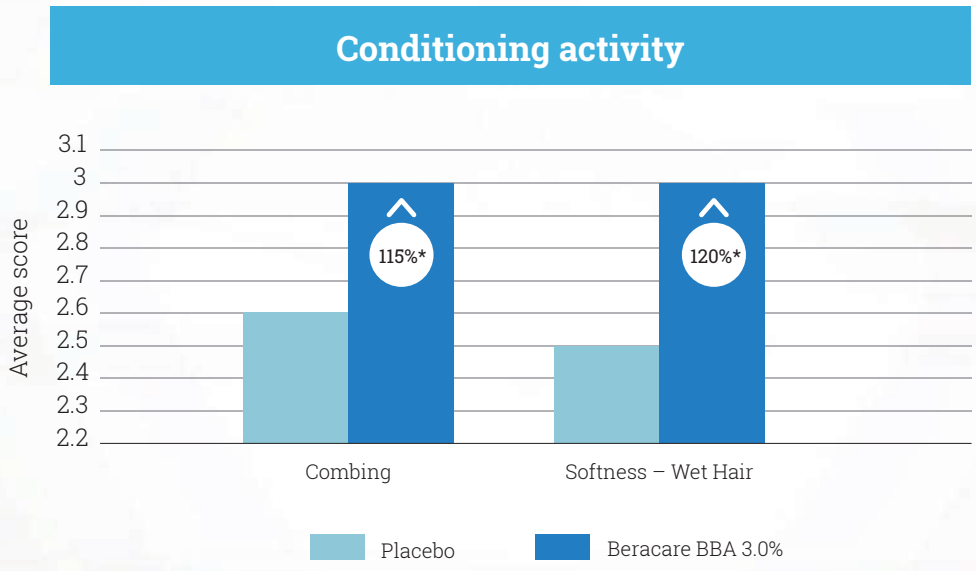
1. The amount of 10 mL of the standard shampoo was applied throughout the volunteers' heads.
The hair and scalp were massaged for 40 seconds;
2. Rinse the hair for one minute;
3. The application of the shampoo was repeated, according to procedure 1;

4. The hair was rinsed for two minutes;
5. The hair was divided in the middle, longitudinally;
6. 10 mL of the conditioner was applied to one side of the head, the same being repeated to the opposite side with the other conditioned conditioner. The hair was massaged for 40 seconds and the corresponding attributes were evaluated;
7. Rinse the hair for one minute;
8. Excess water was removed from the hair with a towel for each side of the head and the corresponding attributes were assessed;
9. After natural hair drying, the attributes were evaluated again.

RESULTS

The following results are based on sensory analysis for Hair Care.

Graph 1 presents the comparative results between **Placebo** and **Beracare BBA** products at 3% for conditioning activity.



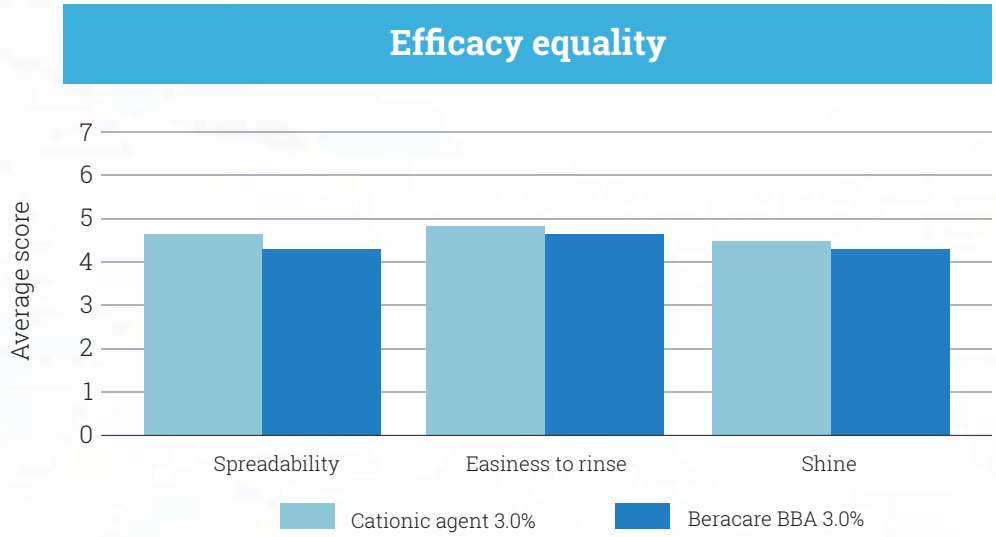
* Statistical significance p<0.05 compared to Placebo.

Graph 1. Results of conditioning activity sensory analysis of Beracare BBA active at 3.0% after salon test.

Table 2 and graph 2 present the results of conditioners **containing cationic** agents and **Beracare BBA** for efficacy equivalence evaluation.

Table 2. Efficacy equivalence results.

Attributes evaluated	Experimentals groups	
	Cationic agent	Beracare BBA
Spreading	4.8	4.3
Rinse	4.9	4.8
Shine	4.4	4.3



Graph 2. Results of effi cacy equality of Beracare BBA active at 3.0% when compared to the cationic agent at 3.0% after salon test.

CONCLUSION

The significant presence of behenic acid in the active Beracare BBA makes it effective in hair conditioning, improving its combability and softness. When compared to traditional conditioning agents in the same concentration, it is able to maintain an equivalent performance in the spreading, rinsing and shine attributes.

In this way, the active Beracare BBA can be an important alternative to the use of traditional conditioning agents.

EFFICACY EVALUATION - SKIN CARE

INTRODUCTION

Human skin, like all other organs, undergoes chronological aging. In addition, unlike other organs, skin is in direct contact with the environment and therefore undergoes aging as a consequence of environmental damage.

The primary environmental factor that causes human skin aging is UV irradiation from the sun, and our main UV protection is melanin.

The melanin is a pigment produced and stored inside melanocytes in the melanosomal compartment and is transported via dendrites to the overlaying keratinocytes. In the skin, melanocytes are situated on the basal layer which separates dermis and epidermis. One melanocyte is surrounded by approximately 36 keratinocytes. Together, they form the so-called epidermal melanin unit.

However, altered production of cutaneous melanin may cause considerable problems of esthetic nature, especially in hyperpigmentary conditions, like melasma, postinflammatory hyperpigmentation, freckles or lentigines.

Development of actives for bleaching hyperpigmented lesions or to safely achieve overall whitening is one of the challenges for cosmetic industry. Especially because the most used actives nowadays are synthetic and evoke many collateral effects mainly on the extracellular matrix (ECM).

The extracellular matrix (ECM) is composed of collagens, elastin, proteoglycans (including hyaluronic acids), and noncollagenous glycoproteins and forms a complex, three-dimensional network among the cells of different tissues in an organ-specific manner.

The ECM was initially considered an inert, space-filling material that provided only mechanical strength to tissues and organs. Today we understand that the ECM is a dynamic
structure that interacts with cells and generates signals through feedback loops to control the behavior of cells.

Collagen is the main structural protein of this tissue has a direct relationship with dermal thickness and mechanical resistance, and its contents decreases with age and external factors like UV.

Hyaluronic acid, a high-molecular weight polysaccharide, is a glycosaminoglycan (GAG), synthesized in the plasma membrane of fibroblasts. It is water attaining capacity suggests that HA may play a major role in the maintenance of the extracellular space, facilitate the transport of ion solutes and nutrients, and preserves tissue deep hydration.

Thus, ECM macromolecules, such as collagen and hyaluronic acid are bioactive and modulate cellular events such as adhesion, migration, proliferation, differentiation, and survival.

From the above, Beraca investigated the potential of Beracare BBA as an active bleaching and skin treatment.

OBJECTIVE

The aim of this study was to evaluate the whitening and anti-aging benefits of Beracare BBA at 2 concentrations on human living skin explants (*ex vivo*).

METHODS

1. Laboratory

The study was perfomed at Laboratorie Bio-Ec: Centre de Recherches Biologiques et d'Expérimentations Cutanées. Study reference 14E3024

2. General study plan

The whitening activity has been evaluated by:

- General morphology observation after Masson's trichrom staining.
- Visualization and quantification of melanin.

The anti-aging activity has been evaluated by:

- General morphology observation after Masson's trichrom staining.
- Glycosaminoglycans (GAGs) staining according to Mowry method.

3. Product tested

All the products that were used in this study are identified at table 3.

Table 3. Products used on the study protocol 190066/2016-0.

Experimental Group	Treatment
ACTIVE INGREDIENT	Beracare BBA
PLACEBO	Caprylic/Capric Triglycerides
POSITIVE CONTROL	α-Arbutina

The products have been stored at room temperature within the duration of the study.

4. Explants preparation

On an abdominal plasty coming from a 45-year-old Caucasian woman (reference: P1244-AB45), explants of an average diameter of 11 mm were prepared.

The explants were kept in survival in BEM medium (BIO-EC's Explants Medium) at 37°C in a humid, 5 %-CO_2 atmosphere.

The duration of the study was 9 days.

5. Product preparation

The tested product was diluted at the desired concentration in the excipient (placebo): Medium-chain triglycerides (Batch 3F4504).

The positive control was diluted at the desired concentration in an aqueous carboxymethyl cellulose gel.

6. Products application

On day 0 (D0), D1, D4, D6 and D9, 2µl of the products were applied topically on the explants and spread with a small spatula.

7. UVA irradiation

Every day, from D0 to D9, the explants of groups labeled "UV" were irradiated with UV type A with a dose of 2.25 J/cm^2 (6 to 8% of UVB) corresponding to a dose of 0,5 MED using a Vilbert Lourmat simulator RMX 3W.

During the irradiation, the explants were transferred into 1 ml of HBSS medium.

The non-irradiated groups were kept in dark in HBSS medium. After irradiation, all the explants were put in fresh BEM medium.

8. Sampling

On D0, the 3 explants of the group T0 were collected and cut in 3 parts: one part was fixed in a buffered formol solution, a second part was fixed in ordinary Bouin solution and the third part was frozen at -80°C.

On D5 and D9, 3 explants from each group were collected and processed in the same way.

9. Experimental protocol overview

The explants were divided into experimental groups. Number of explants, treatment and sampling are described below (table 4).

Table 4. Experimental protocol overview.

Group	Treatment	Number of explants	Sampling
T0	None	3	D0
T Control	None	6	D9
Positive Control	α-Arbutin a 3%	6	D9
Placebo	TCM	6	D9
Beracare BBA 3%	Beracare BBA at 3%	6	D9
Beracare BBA 10%	Beracare BBA at 10%	6	D9
WITH UVA RADIATION			
T Control	UVA	3	D9
Positive Control of UV	α-Arbutin at 3% + UVA	3	D9
Placebo UV	TCM + UVA	3	D9
UV Beracare BBA 3%	Beracare BBA at 3% + UVA	3	D9
UV Beracare BBA 10%	Beracare BBA at 10% + UVA	3	D9

10. Histological processing

After fixation process (24 hours in buffered formol solution and 48 hours fixation in ordinary Bouin), the samples were dehydrated and impregnated in paraffin using a Leica TP 1010 dehydration automat. The samples were then embedded using a Leica EG 1160 embedding station. 5-µm-thick sections were made using a Leica RM 2125 Minot-type microtome, and the sections were then mounted on Superfrost® Plus silanized glass slides.

The frozen samples were cut into 7-µm-thick sections using a Leica CM 3050 cryostat. Sections were then mounted on Superfrost® Plus silanized glass slides.

The microscopical observations were realized using a Leica DMLB or Olympus BX43 microscope. Pictures were digitized with a numeric DP72 Olympus camera with CellD storing software.

10.1 General morphology

The observation of the general morphology was performed after staining of paraffinized sections according to Masson's trichrome, Goldner variant.

10.2 Melanin visualization

Melanin has been visualized by silver impregnation according to Masson's Fontana method.

The melanin was quantified by microscopical observation.

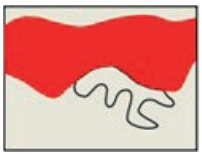
10.3 GAGs staining by Mowry method

GAGs have been stained according to Mowry method (alcian blue P.A.S).

The staining was quantified by microscopical observation.

10.4 Image analysis

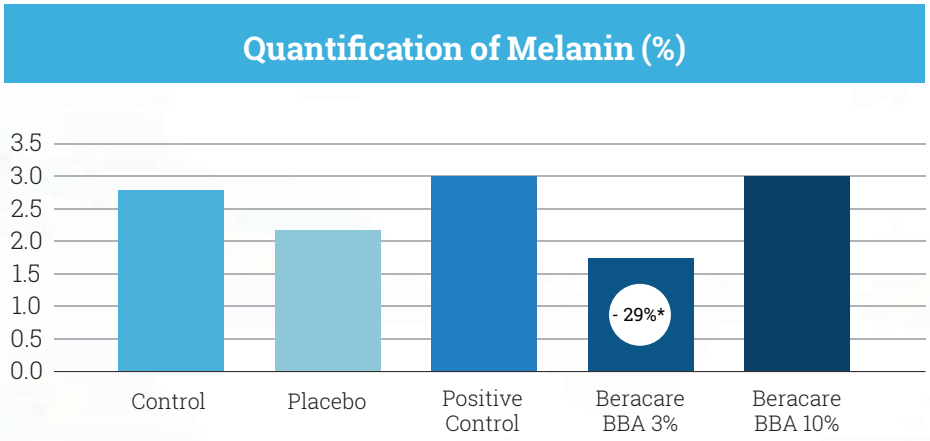
For each experimental group, 9 to 12 images were analysed, according to the method:

1. Immunostaining (Stained structure: green)	
2. Determination of the region of interest. Example : drawing the epidermis region	 Binary mask 3
3. Detection of staining by intensity level selection	 Binary mask 0
4. Selection of the immunostaining in the region of interest	 Binary mask 4 = 3 + 0
5. Surface measurement	Measure of binary mask 3 Measure of binary mask 4
6. Results	Exportation of results to Excel

RESULTS

1. Whitening activity

Beracare BBA was able to promote positive benefits regarding whitening activity. For the non-UVA group, when compared to the control, Beracare BBA 3% was able to reduce melanin content in 29% after 9 days of treatment (figure 2).



* Statistical significance p<0.05 compared to UV control.
Positive control: α-arbutin at 3%

Graph 3: Beracare BBA effect on skin explants melanin content after 9 days treatment without UVA radiation.

For the group with UVA irradiation, both Beracare BBA at 3% and 10% promoted a significant decrease of 21% and 40%, respectively, in the melanin content when compared to the UVA control (Figure 2).

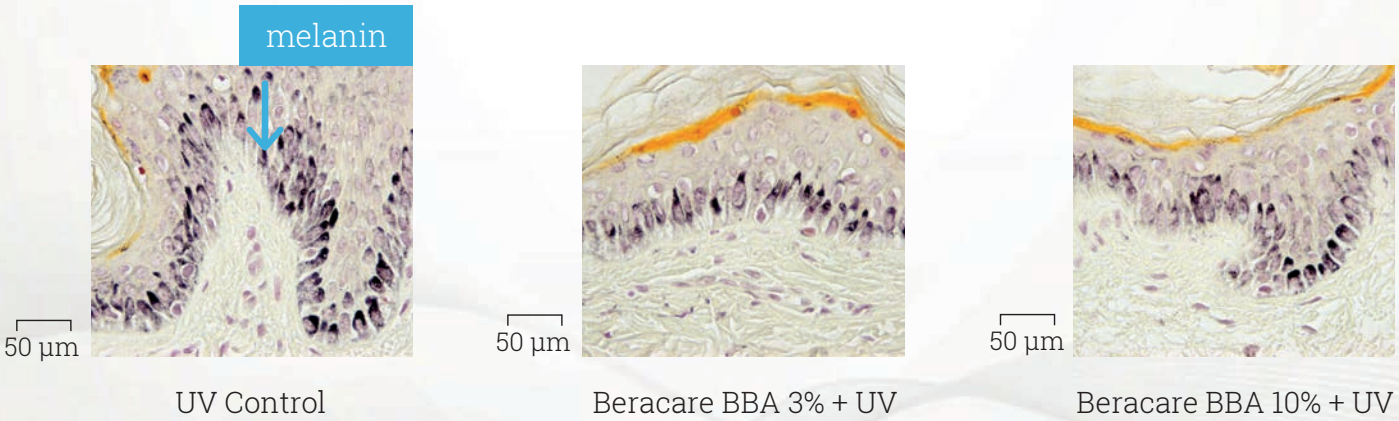
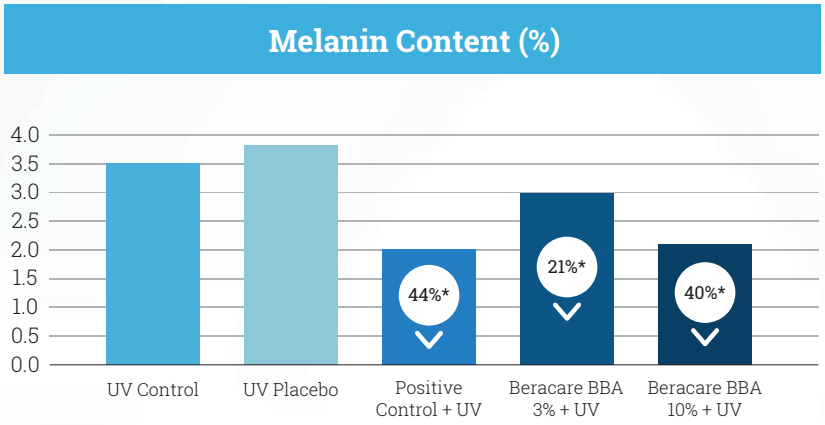


Figure 2. Explants pictures from the UVA irradiated group, control, Beracare BBA 3% and Beracare BBA 10%. UV Exposure: daily from D0 to D9, irradiation with UV type A at 2.25 j/cm^2 (6% to 8% of UVB).



* Statistical significance p<0.05 compared to UV control. Positive control: α-arbutin at 3%.
UV Exposure: daily from D0 to D9, irradiation with UV type A at 2.25 j/cm2 (6 to 8% of UVB).

Graph 4. Beracare BBA effect on skin explants melanin content after 9 days treatment with UVA radiation.

2. Antiaging Benefits

2.1 General Morphology

Considering the antiaging benefits in the general morphology of the explants, Beracare BBA at 3% induced a slightly increase of the cellular layer in the epidermis. In addition, it promoted an increase of the density of collagen network, which becomes quite dense (figure 3).

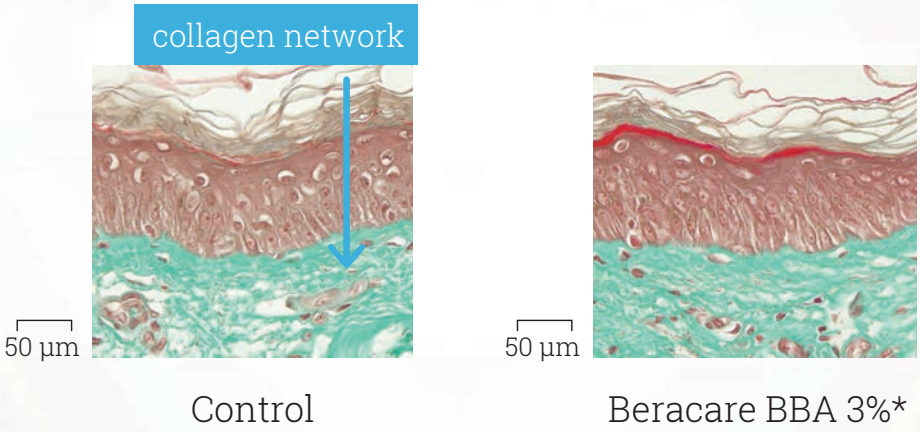


Figure 3. Collagen network image analysis on human living skin explants after 9 days treatment with Beracare Beracare BBA at 3% (non-UVA group).

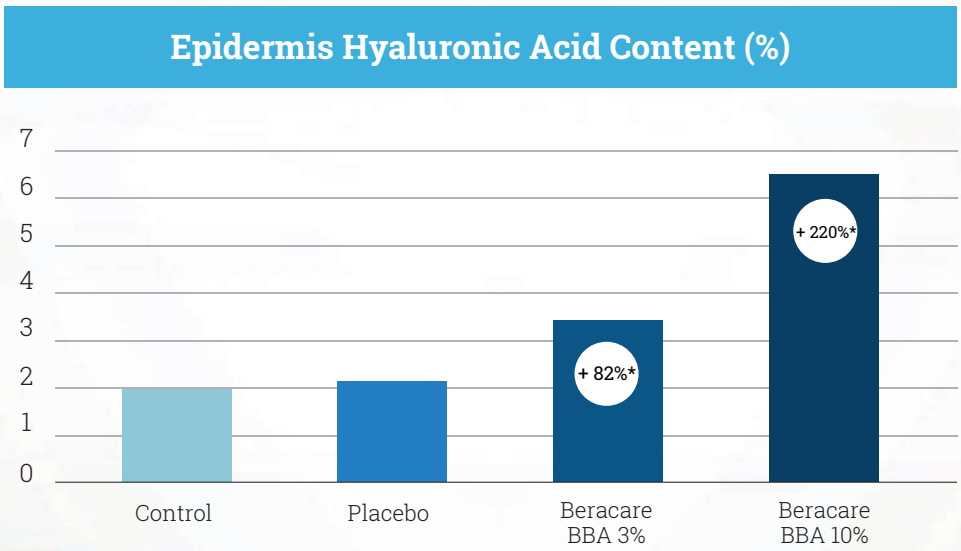
* Statistical significant increase of collagen network density.

2.2. Hyaluronic acid content

For the hyaluronic acid (HYA) content, BBA at both concentrations showed a strong HYA content increase in the epidermis and dermic layer (figure 4).

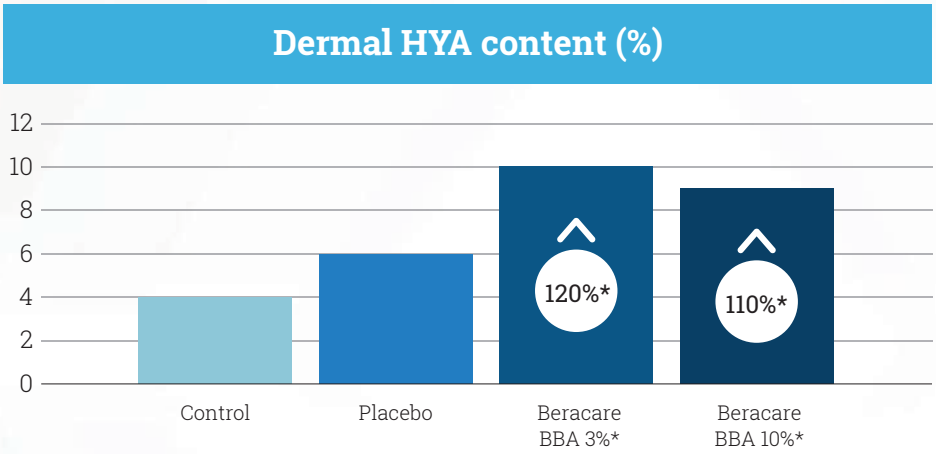
Control | Beracare BBA 3% | Beracare BBA 10%

Figure 4. Hyaluronic acid content image analysis on human living skin explants after 9 days treatment with Beracare BBA at 3% and at 10% (non-UVA group)



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

Graph 5. Beracare BBA effect on skin explants Hyaluronic acid content in the epidermis after 9 days treatment.



* Statistical significance p<0.05 compared to control.

Graph 6. Beracare BBA effect on skin explants Hyaluronic acid content in the dermic layer after 9 days treatment.

3. Results overview

All the results are listed on Table 5.

Table 5. Results overview for the Beracare BBA study for whitening and anti-aging benefits.

Atividade de clareamento		
	No UV	UV
Beracare BBA 3%	↓ 29%*	↓ 21%*
Beracare BBA 10%		↓ 40%*

Benefícios antienvelhecimento			
	Epiderm Hyaluronic Acid	Dermic Hyaluronic Acid	Collagen
Beracare BBA 3%	↑ 82%*	↑ 120%*	***
Beracare BBA 10%	↑ 220%*	↑ 110%*	

* Statistical significance p<0.05 compared to control.
*** Statistical significant increase of collagen network density

CONCLUSION

Whitening actives frequently on the marked are aggressive acids and can bring the skin to a very dry and sensitive state. They also can make the epidermis lose thickness along with water and resistance due to the damage of extracellular matrix components. Skin can get very sensible to sun exposure, dry and itchy during the treatment.

Beracare BBA is a 100% natural ingredient that can provide the whitening effect, while also improving emolliency, hydration, elasticity and resistance, thus delivering real anti-aging benefits.

ATTACHMENT

FORMULATIONS USED IN HAIR CARE TESTS

PLACEBO GROUP	
INGREDIENTS	**% w/w**
Aqua	Up to 100%
Disodium EDTA	0.10
Steareth-2 (and) Steareth-21 (and) PPG-15 Stearyl Ether	3.00
Cetearyl Alcohol	2.50
Helianthus annuus (sunflower) seed oil	2.00
Aqua	5.00
Imidazolidinyl urea	0.30
Fragrance	q.s.p

CATIONIC AGENT AT 3% GROUP	
INGREDIENTS	**% w/w**
Aqua	Up to 100%
Cetyl trimethyl Ammonium chloride	3.00
Disodium EDTA	0.10
Steareth-2 (and) Steareth-21 (and) PPG-15 Stearyl Ether	3.00
Cetearyl Alcohol	2.50
Helianthus annuus (sunflower) seed oil	2.00
Aqua	5.00
Imidazolidinyl urea	0.30
Fragrance	q.s.p

BERACARE BBA AT 3% GROUP	
INGREDIENTS	**% w/w**
Aqua	Up to 100%
Disodium EDTA	0.10
Steareth-2 (and) Steareth-21 (and) PPG-15 Stearyl Ether	3.00
Cetearyl Alcohol	2.50
Helianthus annuus (sunflower) seed oil	2.00
Beracare BBA - Pentaclethra macroloba seed oil	3.00
Aqua	5.00
Imidazolidinyl urea	0.30
Fragrance	q.s.p

PHYSICAL AND CHEMICAL PROPERTIES

ANALYSIS	**UNITS**	**SPECIFICATIONS**
Appearance (above 25°C)	Visual	Viscous liquid, translucid with a fraction of a characteristic precipitated
Appearance (below 25°C)	Visual	Waxy gel
Color	Visual	Light yellow to dark yellow
Odor	-	Characteristic
Specific gravity (20°C)	g/cm^3	0.890–0.930
Refractive index (20°C)	-	1.465–1.475
Acid value (as oleic acid)	%	≤ 3.0
Peroxide value	$meqO_2/Kg$	≤ 10.0
Iodine value	$gI_2/100g$	60–110
Saponification value	mgKOH/g	150–195

FATTY ACID COMPOSITION

Palmitic acid (C16:0)	%	≤ 5.0
Palmitoleic acid (C16:1)	%	≤ 5.0
Stearic acid (C18:0)	%	≤ 5.0
Oleic acid (C18:1)	%	35.0 – 75.0

Linoleic acid (C18:2)	%	10.0 – 25.0
Behenic acid (C22:0)	%	10.0 – 25.0
Lignoceric acid (C24:0)	%	5.0 – 15.0

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 other sources 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 the shelf life.
• After opening the product should 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
PENTACLETHRA MACROLOBA SEED OIL	866620-18-0
TOCOPHEROL	59-02-9, 16698-35-4, 54-28-4, 119-13-1

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