



TECHNICAL DATA SHEET:
REFINED COPAÍBA OIL



BERACA presents a wide portfolio composed of fixed oils, butters, scrubs, clays and actives sustainably sourced from the Brazilian biodiversity. The ingredients sold by the company are directly related to the work developed by extractive communities throughout Brazil. Through the Socio-Biodiversity Enhancement Program®, the company connects biodiversity to thousands of consumers around the world. This means, among other advantages for our stakeholders, transparency, traceability and innovation, which directly contribute to regional development and environmental preservation of different biomes in the country.





GENERAL INFORMATION

The *Copaifera officinalis* species, from the Fabaceae family, is an Amazonian region native plant, popularly known as copaíba. It is a tree that reaches between 25 and 40-meter-high, with aromatic bark, dense foliage, small flowers, and dry podded-type fruits. Its seeds are ovoid, exhibiting a yellow lipid-rich aril. From this plant a gold-yellow to brown oily resin is extracted.

The COPAÍBA OIL comes from secretor squizolytic canals, located in all parts of the tree. These canals are formed by the dilation of intercellular spaces. The resin-oil may be extracted through a perforation in the copaíba tree trunk. The only non-aggressive technique is performing a trunk incision with with a 2-meter diameter auger in two perforations. The first perforation must be done 1 meter above the tree basis and the other one at 1 to 1.5 meter above the first perforation. A PVC tube is introduced into each hole, to drain the oil. After the extraction the holes are closed with clay to protect the tree, what will allow other collections in the same trunk, and these future collections will generate the same or a greater amount of oil-resin than the first collection, without injuring the tree.

Copaíba oil-resin is a terpene and sesquiterpene-rich natural substance, showing potential features for industry sectors, as food, cosmetics, and pharmaceuticals. The COPAÍBA OIL may be used either pure or as a component in the preparation of other products, and it may be used by the industry as a raw material for several products as varnish, paints, films revelation, food aditives, biodiesel, and odor fixing in cosmetics. The copaíba oil-resin is produced in leaves, bark, branches, and in the stem's interior. There is, also, a great interest on the copaíba wood due to its smoothy and brightly surface, and durable, resistant, and waterproof features.

PROPERTIES

The COPAÍBA OIL contains beta-caryophyllene, known by its anti-inflammatory properties as well as by its bacteriostatic action. It may be used in formulations for acneic skin and dermatitis, besides promoting enhanced spreadability and slipping in formulations.

Due to its high concentration of essecial oil, it is also used to promote fragrance in cosmetics.

COSMETIC USE

- Hair products for all hair types (shampoos, conditioners, masks, hair styling creams, ampoules, gels, pomades, finishers, etc.);
 - Body and face products for any type of skin (emulsions, gels, lotions, tonics, liquid and barsoaps, bath and massage oils, etc.);
 - Make ups (lipsticks, compact powders, bases, masks, eyeliners, etc.);
 - Sun and after sun protectors;
 - Scalp treatment products;
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- Acneic skin treatment products;
- Men products (after shave lotions, shaving creams, etc.)
- Natural and organic products.

EFFICACY EVALUATION

INTRODUCTION

Inflammatory skin conditions as acne, dermatitis, dandruff, amongst others, affect a great portion of the population, and often their clinical and aesthetic manifestations are so intensive that can even affect the skin health and appearance. Bacterial infections are responsible for many of these issues and, therefore, ingredients that can act in the control and reduction of bacterial growth are highly valuable for the cosmetics industry.

Phytochemical studies show that copaíba oils are composed by sesquiterpenes and diterpenes, in which the copalic acid, alpha-copaene and beta-caryophyllene are their main components, both responsible for the oil germicide action (SOARES *et al.*, 2003). Beta-caryophyllene is the major component and may reach up to 47% of these components volume (MENDONÇA e ONOFRE, 2009).

In this context, and based on benefits for the skin, Beraca has investigated the REFINED COPAÍBA OIL bacteriostatic power.

OBJECTIVE

This study purpose was determining the REFINED COPAÍBA OIL biopotential as a bacteriostatic agent by applying an *in vitro* test to evaluate the minimal effective concentration demanded for the microbial inhibition of four different microorganisms: *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Escherichia coli* and *Pseudomonas aeruginosa*.

METHODS

1. Laboratory

The test was internally carried out by Beraca's Research, Development & Innovation Laboratory, and its full content follows below.

2. Methodology

To apply the minimal inhibitory concentration (MIC) determination test the laboratory used the deep plates culture technique, that consists in adding the liquid culture medium, followed by adding the test product in a microbial suspension with selected microbial strains.

The bacterial growth in this liquid medium should be identified by the medium clouding, and/or formation of a surfacial film, and/or formation of sediment on plates.



2.1 Concentration of the sample

The sample was evaluated in different concentrations, starting from 0.3 up to 100%, allowing a representative sweeping.

2.2 Negative control

The negative control used in this test was the Tryptic Soy Broth (TSB) as the culture medium.

2.3 Microorganisms used

Strains selected for the study were:

- *Staphylococcus aureus*: considered an opportunistic human pathogen and often associated with infections acquired in the community or hospital environment. The most common infections involve skin and wounds at several sites;
- *Staphylococcus epidermidis*: a natural host of the skin and mucous membranes, and it is considered the negative coagulase species with the highest prevalence and persistence in the human skin and the one with the greatest pathogenic potential, and that is also seen as an important bacteremia (blood infection) agent of hospital origin in both oncology and neonatology services;
- *Escherichia coli*: a microorganism of exclusively fecal origin and that rarely grows out from the intestinal tract, which makes it a good indicator of failure in good manufacturing practices by lack of personal hygiene;
- *Pseudomonas aeruginosa*: species of this genus are Gram-negative, aerobic and mobile bacilli. They grow easily, even in unfavorable conditions and show intrinsic and acquired resistance to the most common antimicrobial agents, being a frequent cause of nosocomial infections.

2.4 Microbial suspension preparation

Microorganisms strains were replicated 48 hours before the experiment in order to assure the best response of microbial growth kinetics.

2.5 Culture medium

To perform the bioassay, Tryptic Soy Broth (TSB) was used as culture medium. TSB is a general-purpose broth that supports the growth of a wide variety of anaerobic, facultative aerobic microorganisms, and fungi according to the ISO 10560:1993.

2.6 inoculum

The inoculum was performed in microplates, one plate for each microorganism, to avoid cross-contamination.

2.7 Incubation

After inoculation, the microplates were incubated in an oven at 35°C for 24 hours. At the end of this period, it was observed whether any microbial growth occurred or not.



RESULTS

After the 24-hour incubation, the culture media remained clear in wells with undiluted samples (100%). The same behavior occurred in decreasing dilutions, up to the minimal inhibitory concentration for bacterial growth be reached. The *in vitro* test results, with minimal inhibitory concentration, can be seen in Table 1 below.

Table 1. Minimal inhibitory concentration (MIC) observed by the action of REFINED COPAÍBA OIL against different microorganisms.

Microorganism	Minimal Inhibitory Concentration (%)
<i>S. aureus</i>	50.0
<i>S. epidermidis</i>	80.0
<i>E. coli</i>	70.0
<i>P. aeruginosa</i>	80.0

According to the data set obtained, it is possible to observe that the REFINED COPAÍBA OIL represents a significant potential of microbial activity for these selected microorganisms.

CONCLUSION

According to all results obtained, the REFINED COPAÍBA OIL presents a strong potential in the inhibition of microbial growth.

Thus, the REFINED COPAIBA OIL is an ingredient with potential inhibitory action against microbial activity and may be a natural and sustainable alternative to conventional bacteriostatic agents.

REFERENCES

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