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SURURU BARK AND ITS USE IN INTERIOR PROJECTS

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Brunno Davisson Melo Cavalcante[1] and Miquelina Rodrigues Castro Cavalcante[2]

ABSTRACT

The materials used in civil construction are constantly evolving in terms of technologies and research. In the search for more efficient and sustainable products, several scientific researches explore materials that are discarded in nature, such as tires, plastic bags, PET bottles, glass containers, in addition to organic materials. The bark of the sururu is studied and applied in the making of various products such as cobogó, wall texture, sustainable bricks and tiles, among others. In view of what has been exposed, this research has as its general objective to study the raw material sururu bark and its use in interior projects. The specific objectives were: to know the raw material sururu bark and its characteristics; to understand the economic impact of sururu bark for the shellfish communities that commercialize it; to understand the various uses of sururu bark in indoor environments. The following methodological steps were carried out: bibliographic research in books, scientific articles, monographs and technical journals on the subject studied; technical analysis and photographic record of environments that used some product developed with sururu bark; interviews with sururu suppliers and companies that use the raw material to make products. It was observed that the block made with the powder of the sururu bark, in comparison with the two conventional blocks, did not present a good thermal performance. It is essential to have more research that intensifies the productive potential of this raw material, also aiming to improve its thermal performance in the environment.

Keywords: Interior Design. Goods. Sururu bark. Sustainability. Materials.

[1]Graduating Technology in Interior Design – IFAL.
Email: bdmc1@aluno.ifal.edu.br
[2]Dr. Professor of the Undergraduate Program in Interior Design Technology – IFAL.
Email: miquelina.castro@ifal.edu.br

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INTRODUCTION

The materials used in civil construction are constantly evolving in technologies and research. In the search for more efficient products, which interfere less and less with the environment, generating fewer impacts, with lower cost values and greater technical efficiency, several scientific researches explore materials that are discarded in nature, such as tires, plastic bags, PET bottles, glass containers, in addition to organic materials.

Due to the concern to promote the reduction of waste generation on the planet, the sustainable lifestyle brings five important issues: rethink, refuse, reduce, reuse and recycle, seeking to contribute to the construction of human behavior committed to the environment (Borges et al, [undated]; Maccari, Oliveira and Seixas, 2019)element.

The term sustainability is used to indicate the ability of human beings to thrive in harmony with the environment, being able to meet their immediate needs with the preservation of this condition for future generations (Ehrenfeld, 2008).

Maceió, the capital of Alagoas, known as the paradise of the waters due to the large bodies of water (ocean and lagoons) that surround it, has the sururu as an intangible heritage. The bark of the sururu is usually discarded and, for this reason, has an important potential for the manufacture of products. According to Santos (2019, p. 89):

> Several works related to mollusk shells as compost for construction, such as the creation of bricks using the shells and the introduction of shells together with pet bottles for the manufacture of sustainable tiles, manufacture of cement, asphalt, cobogó and other materials corresponding to the civil construction sector. In an interview with the coordinator of the NGO Manda Ver, for this area the Ibratin Paints industry tested and approved the texture with the sururu bark.

The Sururu is a mollusk formed by two shells welded on the back and articulated by a hinge, which is a rotation device consisting of two articulated pieces that allow the opening and closing of its armor (figure 1). It has a branchial system that provides oxygen absorption. It has a slow locomotion and spends much of its time buried at the bottom of aquatic environments with brackish water. The species that predominates in the Mundaú Lagoon is *Mytela charruana* (Santos, Rosário and Nascimento, 2022, p. 261, *apud* Leite, 1966).

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Figure 1 – The Sururu and its bark

Source: IPATRIMÔNIO *apud* SECRETARIA DA CULTURA, 2023.

Several professionals in the design area have already worked with the sururu shell for the construction of products. Marcelo Rosenbaum and Rodrigo Ambrósio, renowned Brazilian designers, developed, together with the artisan Itamácio dos Santos, the Mundaú Cobogó (figure 2), whose main raw material was the bark of the sururu. This product was among the 10 finalists of the *Human City Design Award* 2020. This project was based on the circular economy, generating employment and income for the mollusk fishing community and absorbing a large amount of waste that would be sent to landfills (Casa e Jardim, 2021). About 300 tons of sururu houses are discarded annually. Baratto (2021) says that "due to their calcareous property, the crushed barks are compatible with the production of cementitious mass and correspond to 62.5% of the new cobogó. The design of the hollow block was elaborated in order to refer to the shape of the mollusk's shell".

Figure 2 – Mundaú Cobogó

Source: Casa e Jardim, 2021.

The Alagoas company Ibratin, a producer of paints and textures, created some special textures using the bark of sururu and maçunim (figure 3), through the "Maceió Mais Inclusiva" project, which had the support of the shellfish gatherer communities in the lagoon region, on the outskirts of Maceió and in the municipality of Barra de São Miguel, from where the raw materials are extracted. The launch of the textures took place at the end of 2020 and they are already part of the Brazilian interior design scene (Tribuna Hoje, 2020; Correio dos Municípios, 2020).

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Figure 3 – Textures with Maçunim bark and Sururu from Ibratin

Source: Authored by the authors, 2023.

At the IFAL campus Palmeira dos Índios, students of the Higher Education Course of Civil Engineering (Juliana Brito, Arthur Amaral and Hanna Costa) and Professor Sheyla Marques, developed a floor with the bark of the sururu (figure 4). They replaced the sand that would be part of the composition with sururu bark, because it is rich in calcium and perfectly serves the purpose, without losing the quality of the material. The research earned the group approval at the 5th International Conference on Waste: Solutions, Treatments and Opportunity, held in Lisbon – Portugal.

In a research carried out at the Marechal Deodoro Campus of IFAL, a mortar with the crushed sururu bark was developed to replace 50% of the existing area. Carried out by student Renato Menezes in the Master's Degree in Environmental Technologies, under the guidance of Professor Ronny Marques, from Ifal Piranhas, and co-supervision of Sheyla Marques. The research showed promising results within the norm.

Figure 4 – Floor developed by Ifal students.

Source: Federal Institute of Alagoas, 2019.

Like these, other products have been developed with the shell of these shellfish, showing the potential that this raw material presents for the creation of new solutions for buildings in the field of civil construction and interior projects.

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METHODOLOGY

The research consists of a qualitative and quantitative analysis on the theme of sururu bark, the concepts presented came from books, scientific articles, monographs and technical journals on the subject studied.

To understand the use of sururu bark as a sustainable material for the development of products for interior projects, three semi-structured interviews were conducted, two with companies that use the raw material to make products and one with the supplier of sururu bark. The first interview was with Mr. Ricardo, responsible for the production of Ibratin, a company that produces paints and textures, and took place during a technical visit to the company's factory, in the Tabuleiro do Martins neighborhood in Maceió/AL. The second interview took place at the IABS (Brazilian Institute of Development and Sustainability) factory, in the Vergel neighborhood in Maceió/AL, with social worker Saysia Salomão. The last interview was with shellfish gatherer Josieane dos Santos at her workplace, in the Vergel neighborhood, in Maceió-AL.

A comparative technical analysis and photographic records of a block developed with sururu bark and two conventional ceramic blocks were elaborated. The block made with the bark of the sururu was developed through a master's research by student Amanda Tenório da Costa (2021), at the University Center of Maceió (UNIMA). One of the conventional blocks was provided by Professor Janaína Junkes, from the University Center of Maceió (UNIMA) and the other conventional block was provided by the company Casa Tropical. This analysis aimed to study the thermal performance of the block made from sururu bark. Figure 5 shows the sururu block and figure 6 the conventional blocks, respectively.

Figure 5 - Sururu Block

Figure 6 - Conventional Blocks

Source: Authored by the authors (2023).

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For the thermal measurements in the three blocks, a Digital Laser Thermometer (figure 7) was used on December 5, 7 and 10, 2023, in the morning, afternoon and night shifts, at 6 am, 9 am, 12 pm, 3 pm, 6 pm and 10 pm.A distance of 20 cm between the blocks was used.

To make the thermal images, a Flir Mr 176 thermal imaging camera (figure 8) was used with a thermal imaging sensor. This camera is capable of capturing and measuring the thermal radiation emitted by objects and surfaces, allowing an accurate visualization of temperature differences through color variation. The thermal images were taken at a distance of 1.50m from the blocks.

Figure 7 - Digital Laser Thermometer

Source: KLX Quality and Innovation (2023).

Figure 8 - Flir Mr 176 Thermal Camera

Source: flir.com.br (2023).

RESULTS

Charts 1, 2 and 3 present the summary of the answers of the three interviews conducted.

Chart 1 - Interview with Mr. Ricardo from Ibratin on 02/09/24

● It started with the proposal of IABS and Marcelo Rosenbaum;
● They acquire the raw material with the IABS;
● After the arrival of the raw material, they carry out a long process to develop its texture in a mini-factory in the industry;
● They sell the texture in the 25 kg bucket;
● The chemical composition they found in the sururu bark was a lot of calcium;
● They recognize the importance of helping the environment, the families who work with the sururu;
● They did not do any thermal performance test with the sururu texture.

Chart 2 - Interview with social worker Saysia Salomão from IABS on 02/28/24.

● The use of sururu began with the interest of solving a problem in the neighborhood, several partners joined;
● They purchase the sururu peels from the registered shellfish gatherers, there is a specific day for this;
● They pay R$ 0.50 per Kg;
● Creation of the Sururote social currency;
● The manufacturing process consists of: We receive the shells, stock, crushing and sieving, mass production, shape, curing time, drying, polishing, separation, boxing and firing to Portobello;

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● We sold Cobogó and Ibratin's input.

Chart 3 - Interview with Marisqueira Josiane (28/02/24)

● The shellfish gatherers have an average of 12 more hours of work per day;
● On average, eight cans are collected that correspond to 16 kg of sururu bark;
● The shellfish gatherers do not work with any protective equipment;
● Sell the peels after cleaning to the IASB
● There is no appreciation for this profession;
● They do not receive support from the government. It improved a little with the sale of the peels to IABS.

Figure 9 shows the photographic record of the technical visits and interviews carried out.

Figure 9: Interviews with Josiane, Ricardo and Saysia respectively.

Source: Authored by the authors (2024).

Figure 10 shows the photographic records of the application of products developed with sururu bark; texture and cobogó.

Figure 10 – Products developed with sururu bark.

Source: Authored by the authors (2023).

Figure 11 shows the thermal measurements and thermographic images of the three blocks studied.

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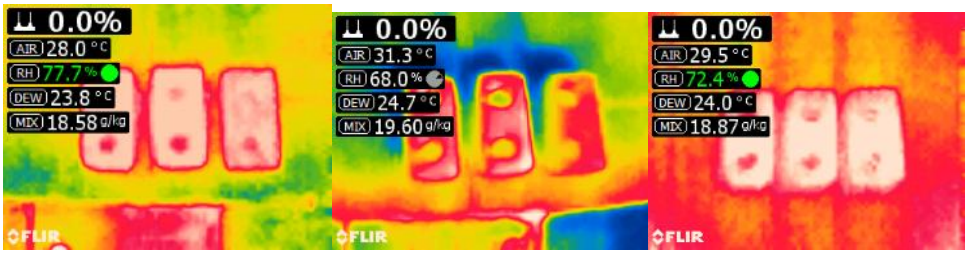
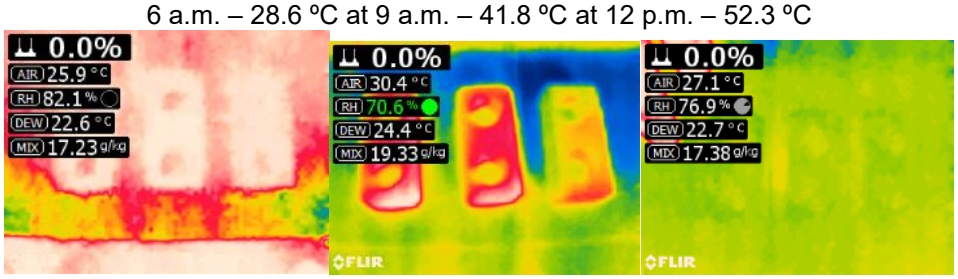
Figure 11 - Thermal measurements and thermographic photos of the Sururu Block and Conventional Blocks



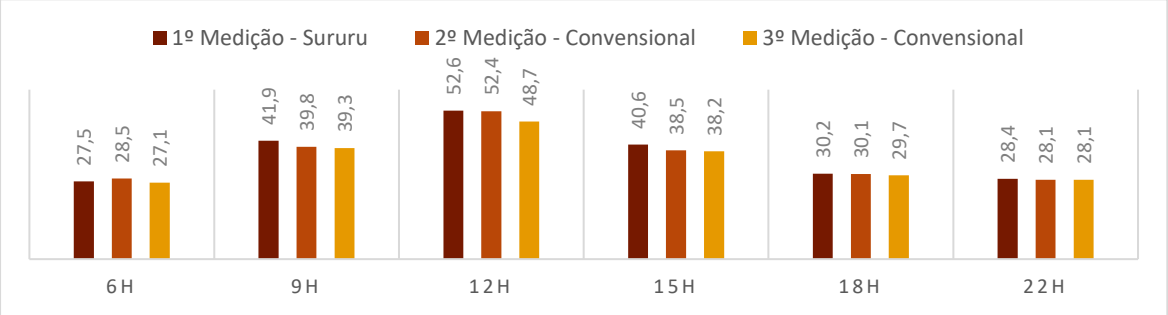
6 a.m. – 28.6 ºC at 9 a.m. – 41.8 ºC at 12 p.m. – 52.3 ºC



3 p.m. – 46.0 ºC to 6 p.m. – 32.1 ºC to 10 p.m. – 29.1 ºC
Source: Authored by the authors (2023).

Graph 1 shows the comparison of the means of the blocks. The brown bar represents the sururu block. The orange bar is from a conventional block of UNITI and the yellow bar represents the conventional block, provided by the company Casa Tropical.

Graph 1 – Comparison of the Means of the Blocks



Source: Authored by the authors (2023).

Graph 1 showed that, at times with higher incidence of solar radiation (9 am, 12 pm and 3 pm), the block developed with the sururu bark presented higher values of thermal radiation emitted.

CONCLUSION

The work presented in this research aimed to study the raw material sururu bark and its use in interior projects. Some products with this raw material are already being marketed, but more research is needed regarding their production potential.

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When analyzing the thermal performance of the block made from the powder of the sururu bark compared to conventional blocks, it was observed that the block with the sururu bark did not present a good result. The block that presented the lowest thermal radiation emitted was the conventional block provided by the company Casa Tropical, being, therefore, the best result.

As future works, it is expected that research will be developed that will improve the thermal performance of blocks made with sururu bark powder and other organic materials.

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