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STUDY OF FIBERS OBTAINED FROM THE VEGETABLE SPECIE MONTRICHARDIA LINIFERA (ARACEAE) TO EVALUATION OF THEIR TECHNOLOGICAL APPLICATION.

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Abstract. *Studies had proved that the utilization of natural fibers in replace of synthetic it's an exceptional alternative in reference of the sustainability aspects. In that sense, the aim of this research was to evaluate if the specie Montrichardia linifera (Arruda) Schott present fibers with industrial potential. The samples were collected in the lake of the research Campus of Museu Paraense Emílio Goeldi. The fibers were obtained on three different types of maceration: biological maceration, chemistry maceration, with a watery solution of 5% of NaOH, and by dew, where the stem was left in a dry space to lose moisture. After the daily analysis, the ideal period for fiber extraction was determined, being 25 days for biological maceration, 15 days for chemical maceration and 12 days for dew. The stem cytology was performed to characterize the fiber through the optical microscopy and SEM procedures, showing potential due to its dimensioning. The mechanical tensile tests on the fibers had good results, being framed among the fibers already used in the market, having approximately 1kgf and 8kgf/mm² of Bursting Strength and Bursting Voltage, respectively. The results give room for further research with this potential fiber.*

Keywords: *Montrichardia. Maceration. Natural Fiber.*

1. INTRODUCTION

The utilization of natural fibers in replace of synthetic fibers proved to be an exceptional alternative to the reality experienced by the humanity. The fibers use it's so meaningful that there's no a product which the man had more contact in the daily than itself (Medina, 1959), for this reason many research are being making looking for alternatives of create it's type of material, always aiming the cost-benefit and attempting to the environmental laws, as the law nº 9.005 of 01th, June of 1995, which quest to decrease the impacts in the environment made by the fabric process and to reduce feedstock petroleum products.

Following Furtado (2002), the total exploitation of fiber material, as textile feedstock, are based in these factors: elongation and elasticity of the fiber, resistance to rupture, thermal retention, possibility of being targeted and dyed, boiling fastness and resistance to climatic variations.

One of the longest fibers studded was the Montrichardia linifera Schott. (Arruda), extracting its fibers bundles up to 2,50 meters of extension. Beyond of its accentuated length, it presents a big resistance to rupture (Furtado, 2002). However, there's little knowledge about this fiber material and its possible uses.

the current scenario and the search for a fiber of good quality, some articles developed shows that aninga was feedstock of an excellent fiber, otherwise a lot of studies have to be done yet, like mechanical tests and thermal that

prove its superiority, is this sense and with the needed of new forms of emanate the anthropic impacts over the environment, this study becomes essential..

2. EXPERIMENTAL PROCEDURE

It was collected stem samples of Montrichardia linifera (Arruda) Schott. from distinct locations, at Museu Paraense Emílio Goeldi, Av. Perimetral, nº 1901 – Terra Firme, Belem - PA (Figure 1).

Figure 1. Museu Paraense Emílio Goeldi

In first time it was verified what was the Best maceration process to obtain the fibers of the study plant, and parallel this part, it was made the cytology of the stem of itself. Lately it was made test of mechanical traction of fibers obtained previously.

2.1 Biological Maceration

The biological maceration was made in the laboratory of chemistry analyses, varying between 20°C to 30° C (Figure 2).

Figure 2. Biological maceration

2.2 Chemical maceration

In the process of chemical maceration, the fibers were placed into 5 liters of watery solution on 5% NaOH (Figure 3).

Figure 3. Chemical maceration

2.3 Maceration by "dew"

The maceration by "dew" consisted of put the stem to macerate without any help of substance or macerative technique (Figure 4).

Figure 4. Maceration by dew

2.4 Microscopy

Part of the stem was selected and prepared to embedment and after cutted into the microtome, thereby the blades was got and it was characterized through of inclusion of Astro's blue and safranine (Figure 5).

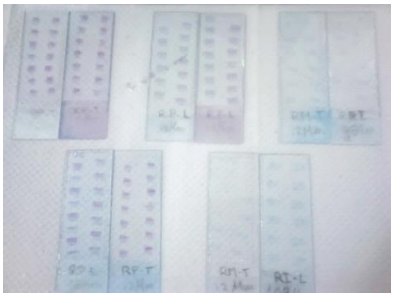

Figure 5. Blades with aninga's stem

2.5 Scanning Electron Microscopy

The fibers samples were placed in the desiccator for 24 hours and by the end the images was taken in SEM.

2.6 Tensile Test

The tensile tests were done in Universal Testing Machine model VERSAT 2000 (Figure 6).

Figure 6. Samples in the tensile test

3. RESULTS AND DISCUSSION

3.1 Maceration Process

On chemical maceration process lasted 15 (fifteen) days, showing up excellent fibers, slightly more dusky. The second maceration process had duration of 25 (twenty-five). The maceration by dew it was the most satisfactory of all macerating process, because on 12 (twelve) days it was already possible to get the fibers with facility.

3.2 Optical microscopy

It was evidenced that the areas of fibers in the transversals cuts showed irregularity, presenting different diameters. It was verified yet that the region more peripheral of stem it's rich with textile material, in the transversal cut (Figure 7) as well as in the longitudinal, where the fibers are identified by the red color.

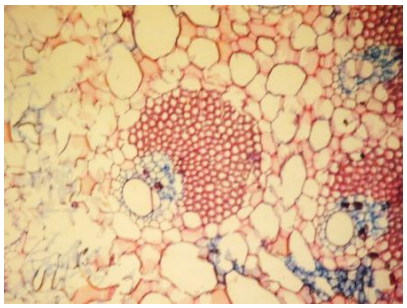

Figure 7. Transversal section of peripheral of *Montricharia linifera*'s stem

3.3 Electron Microscopy

The images made on SCEM demonstrate that the material does not have into its composition silicate, probably the same is rich of cellulose. The Figure 8 shows basically tracheids and fibers.

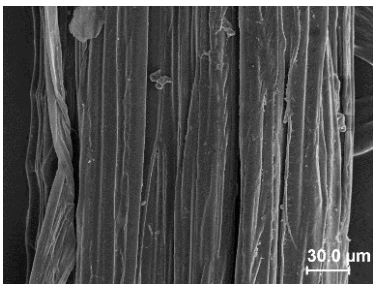

Figura 8. Longitudinal view of Montrichardia linifera's fibers. Source: SEM

3.4 Tensile Test

The biggest obstacle was attaching the fiber to the traction jaws. The results were very satisfactory (Table 1).

Tabela 1. The results of tensile tests for the biological maceration spontaneous

Properties (units)	Medium values
Diameter of the unitary fiber (µm)	7,50 a 13,25
Apparent bundle diameter (µm)	300 a 400
Breaking force (gf)	1090,26
Elongation (mm)	3,90
Tensile strength (gf/mm^2)	8206,20

4. CONCLUSIONS

The ideal period for the washing and mechanical maceration stage is between the thirtieth and the thirty-fifth day. In the second stage of the study it was observed that the most suitable process for fiber extraction is maceration by Dew, being possible to obtain it in twelve days.

After studying the stem histology, it was verified that there is irregularity in the diameter of the fiber. In the same study the presence of significant fiber in the peripheral region of the stem was verified. The tensile test of the fiber from the process of spontaneous biological maceration these were very resistant giving focus for new studies.

5. ACKNOWLEDGEMENTS

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