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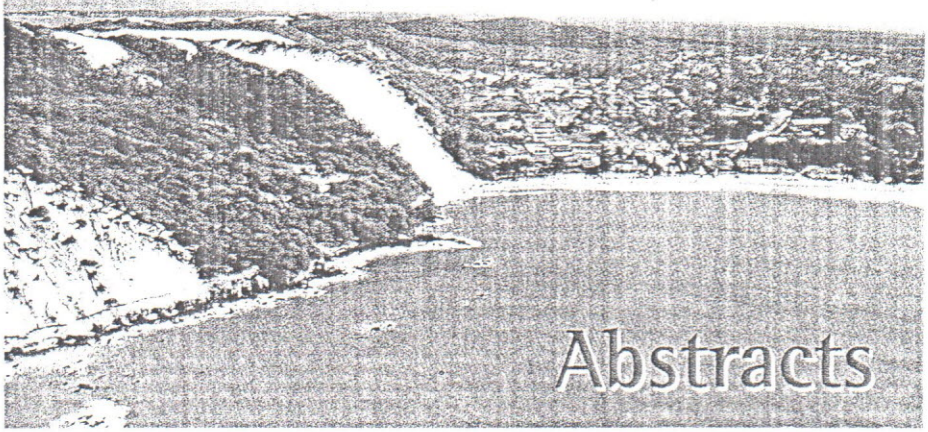

Abstracts

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A preliminary study of the natural rubber / açaí fiber composites

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Abstract – Composites of açaí fibers and natural rubber have been investigated through thermogravimetric analysis and mechanical properties. The açaí fibers exhibited a thermal behavior comparable to other natural fibers industrially utilized in polymeric composites, which is promising for new applications.

Açaí (*Euterpe oleracea* Mart.) is a palm plant widely diffused and cultivated in Amazon regions especially in Pará, a state of Brazil, where the pulp of the fruit has a large consumption as juice (about 180 tons/year). The fruit is purple-black at complete maturity with a diameter of 10-15mm, and the seed is about 80% of the fruit size, and is covered with fibrous fibers. The açaí processing produces a large amount of residues, consisted mainly of the seeds and the fibers, which are a serious environmental problem [1, 2]. The aim of this work was to use the açaí fibers to obtain composites with natural rubber (NR) matrices. The composites have been characterized using thermogravimetric analysis (TGA) and mechanical properties.

The preparation of natural rubber composites from GT 1 and RRIM 600 clones was made as described by Dall' Antonia *et al.* [3]. TGA curves were obtained in a TA instrument Q500, at a heating rate of 10 degree/min. in nitrogen atmosphere. Mechanical tests followed ASTM D 412-92, and they were carried out using an Instron Machine, at a crosshead speed of 500 mm/min

Table 1 shows the results of mechanical properties of the natural rubber compounds and the composites with 5% and 10% of açaí fibers. It can be observed that the compounds show lower modulus and higher tensile strength than the composites, and that the composites with 5% of fibers show the highest values for mechanical properties indicating that is the best fibers load. It can also be observed that for the tensile strength, there is no significant variation among the samples for the GT 1 clone. On the other hand, for the RRIM 600 the compounds show about 40% higher than the composites with 5% of fibers. Açai fiber / NR composites show mechanical properties comparable to the composites with other natural fibers [4, 5].

Figure 1 shows typical TG/DTG curves for the açaí fibers and the composites with clone GT 1, for instance. The fibers have shown good stability up to around 230 °C and have three-degradation steps process in inert atmosphere. The compounds and the composites show good stability up to about 300 °C, and a degradation process in one step. It can be seen that the addition of the fibers did not influence the thermal stability of the composites. The temperature at which 50% decomposition occurs is generally considered as an index of thermal stability. This temperature is about 380 °C for the compounds and the composites. The açaí fibers exhibited a thermal behavior comparable to other natural fibers industrially utilized in polymeric composites, which is promising for new applications.

Table 1: Mechanical properties of the samples.

Samples	Modulus (MPa)	Tensile strength (MPa)
GT 1	2.2 ± 0.4	14 ± 6
GT 1 / 5% fibers	4.5 ± 0.8	13 ± 3
GT 1 / 10% fibers	3.3 ± 0.2	11 ± 1
RRIM 600	2.6 ± 0.4	22 ± 2
RRIM 600 / 5%	5.7 ± 0.4	16 ± 2
RRIM 600 / 10%	3.9 ± 0.6	12 ± 2

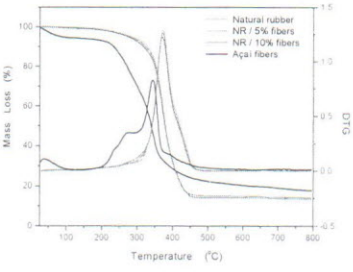

Figure 1: TG/DTG curves of the samples.

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