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MECHANICAL CARACTERISATION OF POLYESTER AND SUNFLOWER NATURAL FIBER COMPOSITE

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Summary. *The use of natural fibers as reinforcement in polymer matrix composites is gaining popularity in the development of renewable products. Although glass and other synthetic fiber-reinforced plastics possess high specific strength, their fields of application are very limited because of their inherent higher cost of production. This work deals with the characteristics of natural fiber composites that can offer several advantages, like low cost, weight savings and relatively good mechanical properties. It focuses on the effects of sunflower fibers as reinforcement agents in composites. Mechanical testing of Sunflower natural fibers composite was performed to qualify and quantify the reinforcement properties. At same time, Glass fiber composite sample tests have been produced and characterized and both results have been compared.*

From results comparison we can affirm that the produced polymeric sunflower fiber composite has adequate mechanical properties for lots of industrial applications even, as expected, these are lower than glass fiber composites. Using this natural fiber content this product become a more ecological substitute and environment friendly that the traditional polymeric glass fiber composites. For other way, once stems from sunflower plants are wastes that traditionally are left in the field, shredded and incorporated in to the soil, acting like natural low cost substrate, by collecting them and giving them some commercial value will make crops more profitable.

1 INTRODUCTION

This work objective was evaluate the use of natural fibers from autochthones plants without commercial value for production of "green" composites once the higher value-in-use may mean increasing the content of a local material (a natural fiber) in the local production of a part (a composite) for the assembly of an otherwise international product (a car as example) (Wallenberger and Weston, 2004).

The mechanical properties of a natural fiber-reinforced composite depend on many parameters, such as fiber strength, modulus, fiber length and orientation, in addition to the fiber-matrix interfacial bond strength (Hussien *et al.*, 2009).

2 PROCEDURE

For the production of sunflower fiber reinforced composite, year plants stems have been collected some days after sunflower crop. The stems have been smashed to allow tender plant tissues to separate from plant fibers. After extraction, these fibers have been naturally air

dried. Sunflower fibers were cut into pieces with length varying from 25 mm to 40 mm to allow better impregnation when producing the composite plates. Polyester resin plates with sunflower fibers with random disposition have been produced controlling the fiber weight content. For comparison, had been produced plates of polyester resin composites reinforced with glass fiber. In both cases, test samples have been cut according the applicable standard.

A total of 10 individual tests were performed for each type. The tensile tests were performed according to ASTM D3039 at room temperature. Load-elongation curve, braking load, peak stress were acquired in real time by testing machine and provided at the end of each test. Flexural tests were performed according to ASTM D790 to determine flexural strength and the elastic modulus in flexure of the composites.

Figure 1 - Left: Cropped Sunflower stems and extracted fibres; Right: Sunflower composite test samples.

3 CONCLUSIONS

As conclusion we can affirm that the produced polymeric sunflower fiber composite has adequate mechanical properties for lots of industrial applications even, as expected, these are lower than glass fiber composites. Using this natural fiber content this product become a more ecological substitute and environment friendly that the traditional polymeric glass fiber composites. For other way, once stems from sunflower plants are wastes that traditionally are left in the field, shredded and incorporated in to the soil, acting like natural low cost substrate, by collecting them and giving them some commercial value will make crops more profitable.

As further work, other wastes from autochthone species natural fiber composites are also in study and in the way to be characterized.

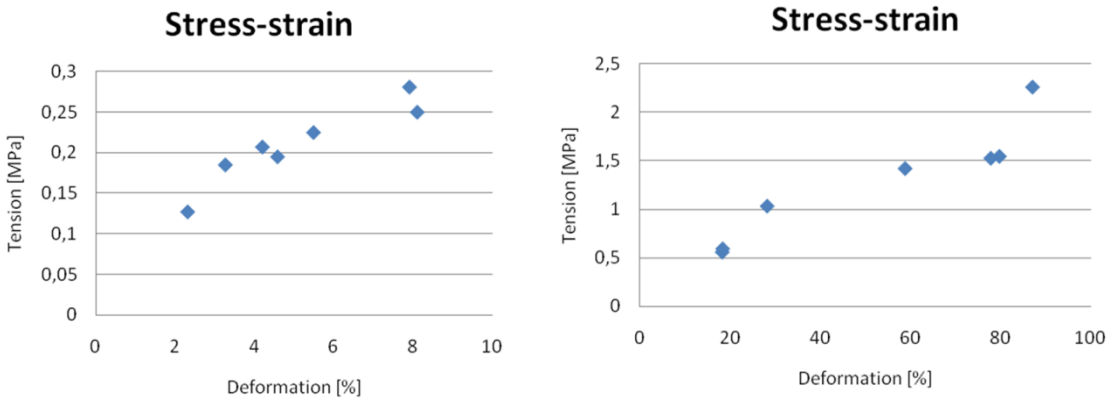

Figure 2 - Stress Strain Graphics comparison: Left: Sunflower composite; Right: Glass fiber composite.

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