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Effect of structural parameters on the tensile properties of multilayer 3D composites from Tururi palm tree (*Manicaria saccifera* Gaertn.) fibrous material

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ABSTRACT

Tururi (*Manicaria saccifera* Gaertn.) is a naturally integrated fibrous structure in a form of sac, which protects the fruits of the Amazon Ubuçu palm tree. The goal of this research was to develop and characterize multilayer 3D green composites from Tururi fibrous material and identify applications based on their performance. A total of 12 composite samples were fabricated using Vacuum Assisted Resin Transfer Molding Technique (VARTM) to study the effect of the structural parameters, namely, number of Tururi fibrous layers, fiber orientation, and fiber volume fraction on the tensile and impact behavior of the final composites. The focus of this paper will be on the tensile properties in the sac and cross directions, as for the impact properties, it will be covered in another publication. It was found that a proper stacking sequence, can produce composites from Tururi fibers with quasi-isotropic tensile behavior, and with the proper combination of number of layers, and stretch %, the tensile properties of the produced composite can be optimized.

Keywords: *Manicaria saccifera*; Tururi fiber; natural fiber composite; 3D composite; Vacuum Assisted Resin Transfer Molding; ODF

1. INTRODUCTION

Most of the current commercial composites are reinforced with synthetic fibers from the ever depleting petroleum, which have a negative impact on the environment. These fibers are from non-renewable resources, not biodegradable, consume a significant energy in their production, and expensive to dispose their composites. Those issues have prompted researchers to investigate the development of composites from sustainable natural materials that are inexpensive, biodegradable, and environmentally friendly [1-8]. Traditionally, natural fibers are destined mainly for the production of