

Investigating an Ecofriendly and Economically Viable Alternative to *Quercus rubra* (Northern Red Oak) and *Quercus alba* (White Oak) Woods in Construction, Through a Tensile Examination of a Composite Prototype Composed of Polyethylene terephthalate (PET), Polycarbonate, and *Agave sisalana*

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Materials have rapidly become scarce and costly to produce and acquire, which has been due to several factors, including disease, deforestation, worker strikes, and more. The purpose of this year three continuation project was to perform further testing, this year in the form of tensile testing on a composite prototype consisting of recycled *Agave sisalana* fibres, polyethylene terephthalate, and polycarbonate to compete with construction grade lumber, specifically *Quercus rubra* and *Quercus alba*, also known as Northern Red Oak and White Oak. Four specimens of the composite were created, following the predetermined recipe (determined from project year two, and its results) of 63% polyethylene terephthalate, 31% polycarbonate, and 6% *Agave sisalana* fibres. This year, the samples underwent tensile examinations (three-point flexural testing was examined in project years one/two) to determine the flexibility, yield strengths, and breaking points of the composite. The samples, particularly sample A, were able to compete with, or outperform, the samples of oak wood. These results are very promising, as there has been a significant improvement in the consistency and outlook of the results from the last two years of projects. The hypothesis stated that the composite could rival the samples at less costly and efficient levels. The hypothesis was proven correct, as the samples tested similarly, or better, than the lumber samples, whilst at very comparable costs, easily obtainable level, and, possibly, more impactful levels to our environment.

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