Influence of dammar gum application on the mechanical properties of pineapple leaf fiber reinforced tapioca biopolymer composites

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ABSTRACT

The objective of this work is to investigate the influence of the utilization of dammar gum (DG), which is a biodegradable and renewable binder, on the mechanical properties of short pineapple leaf fiber (PALF) reinforced tapioca biopolymer (TBP). Samples with variable DG concentrations (10%, 20%, 30%, and 40% by weight) and a constant 30% PALF composition were created with varying TBP percentages using an internal mixing process and compression molding. The results showed that PALF-TBP with 10% DG had the highest mechanical properties with tensile, flexural, and impact strength of 19.49 MPa, 18.53 MPa and 13.79 KJ/m^2, respectively. Scanning electron microscopy (SEM) images prove the enhanced mechanical characteristics. In addition, Fourier transform infrared spectroscopy (FTIR) analysis showed that the DG improves the matrix and PALF interface. The results show that the utilization of DG significantly enhanced the mechanical characteristics of composites. In addition, it is anticipated that it will be able to create PALF-TBP-DG composites as a potential alternative for conventional polymers in various applications, especially in engineering applications such as automotive and packaging industries. Therefore, it is expected to be capable of contributing to sustainable development goals (SDGs).

KEYWORDS

Bio composites; Dammar gum; Natural fiber composites; Pineapple leaf fiber; Sustainable development goals (SDGs); Tapioca biopolymer

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