

# Effect of fabrication parameters on strength of natural fiber polypropylene composites: Statistical assessment

## Abstract

This paper presents a statistically assessed processing and experimental characterization of mechanical strength of two types of natural fiber polymer composites reinforced with date palm fronds and pine needles. Fifteen bio-composites samples were fabricated per the Design of Experiment (DoE) using a simple hand lay-up method. The experimental design of bio-composite specimens includes three fabrication parameters with three levels for each parameter. These include fiber volume fraction (10, 30, and 50 vt.%), fiber length (10, 30, and 50 mm), and Alkali treatment (1, 2, and 3 wt%). The tensile and flexural strengths were evaluated in accordance with ASTM standards for all samples. Also, Response Surface Methodology approach was utilized to analyze the combined effect of interacting processing parameters on response. SEM analysis of untreated and treated fibers and tested bio-composites revealed that proper alkali treatment of fibers has a high impact on bonding between fiber and surrounding matrix.