

## Abstract

In this study, the Enset fibers were equally divided lengthwise from bottom to top into four portions explicitly 0–300 mm (EV-I), 300–600 mm (EV-II), 600–900 mm (EV-III), and 900–1200 mm (EV-IV), and the physio-mechanical properties were investigated at three different GL (Gauge length). The distribution of the physical properties of the mass, cross-sectional area, linear density, and diameter was decreased along the fibers portion from bottom to top at three different tests GL. In terms of mechanical property distributions, the Enset fiber's tensile strength grew considerably at around the height of over 25% of the portion along the length (EV-300) from the bottom and reduced marginally at its top places in each test GL. Regarding the significance of tensile properties, the overall ANOVA has no significant difference while the interaction between the locations along the length of enset fiber has a significant difference, and this variation is also confirmed by the Weibull distribution. The current study looks into the physical and mechanical properties of Enset fibers, which are controlled by the position of the leave sheath, which is used as an input to optimize its variation for unidirectional composite applications.