

Material characterization of Roselle fibre (*Hibiscus sabdariffa* L.) as potential reinforcement material for polymer composites

ABSTRACT

Recently, in line with rising environmental concerns, researchers are now replacing synthetic fibres with natural ones as the main component in composites. Natural fibres are preferred to synthetic fibres because of several advantages such as biodegradable, light weight, low cost and good mechanical properties. Roselle is one of the plants found to be suitable to be used to produce natural fibres. In this work, we analysed the physical, thermal and mechanical characteristics of roselle fibre. Roselle fibre has good physical properties which lead to the dimensional stability of the composite product. The result obtained indicated that the moisture content of roselle fibre is 10.9%, while water absorption is 286.5%. Thermal gravimetric analysis (TGA) was conducted to understand the thermal stability of roselle fibre at high temperature. The results show that the initial degradation of roselle fibre starts at 225 °C and completes the decomposition of the lignocellulosic component at 400 °C. A tensile test was conducted to investigate the mechanical properties of roselle fibre. The tensile strength of roselle fibre is 130 - 562 MPa. On the basis of the properties of roselle fibres obtained, we concluded that roselle fibre is one of the good natural fibres that can be used as reinforced material for the manufacturing of polymer composites for different applications, while at the same time saving the cost required to manage the agro waste.

Keyword: Roselle fibre; Physical properties; Thermal properties; Tensile test; Mechanical properties