Characterization of natural cellulosic fiber isolated from Malaysian cymbopogan citratus leaves

ABSTRACT

A novel natural fiber derived from the Cymbopogan citratus plant was investigated for the first time. The characterization of the C. citratus fibers was conducted, and the chemical composition and physical, thermal, mechanical, crystallinity, and morphological characteristics were studied. The chemical composition analysis of Cymbopogan citratus fiber revealed that the suggested fiber was rich in cellulose contents (37.6%). The tensile test of C. citratus fiber demonstrated the fiber's average tensile strength of 43.81 ± 15.27 MPa and modulus of elasticity of 1.046 ± 0.33 GPa. Further analysis with X-ray diffraction (XRD) confirmed that the crystallinity index of Cymbopogan citratus fiber was 35.2%, and the crystalline size was estimated as 4.28 nm. The Cymbopogan citratus fiber's thermal stability was investigated via thermogravimetric analysis (TGA) and observed to be thermally stable (230 °C). A morphological investigation was employed on the fiber via a scanning electron microscope (SEM). The morphological study result exhibited that the fiber had a perforated and rough surface with the lumen in the center. Thus, the findings revealed that the Cymbopogan citratus fiber was a promising potential reinforcement for thermoplastic green composite applications.