

Biocomposite of cassava starch-cymbopogon citratus fibre: Mechanical, thermal and biodegradation properties

ABSTRACT

Increasing environmental awareness and concern have shifted the focus of research and development towards biodegradable materials development. In the current study, Cymbopogon citratus fibre (CCF) were incorporated into thermoplastic cassava starch (TPCS) with various content of CCF (10, 20, 30, 40, 50, 60 wt.%) via compression moulding. The determination of fundamental characteristics of TPCS/CCF biopolymer composites was conducted to assess their potential as biodegradable reinforcements. Characterization of the samples was conducted via Fourier-transform infrared spectroscopy (FT-IR), thermogravimetric analysis (TGA), and scanning electron microscopy (SEM), as well as mechanical, moisture absorption, and soil burial testings. The findings showed that the improved tensile and flexural features of the TPCS composites with CCF incorporation, with 50 wt.% CCF content yielded the maximum modulus and strength. The thermal properties of the biocomposite demonstrated that CCF addition improved the material's thermal stability, as shown by a higher-onset decomposition temperature and ash content. Meanwhile, the CCF incorporation into TPCS slowed down the biodegradation of the composites. In term of morphological, homoge-neous fibres and matrix dispersion with excellent adhesion was observed in morphological analyses using scanning electron microscopy (SEM), which is crucial for the enhancement of the mechanical performance of biocomposites.