

## **Preparation and characterization of cassava bagasse reinforced thermoplastic cassava starch**

### **ABSTRACT**

A starch-based composite film was prepared by using fibrous residual of starch extraction (cassava bagasse) as filler. Composite films were prepared through casting technique using fructose as a plasticizer and various sizes and concentrations of bagasse. The physical, thermal, tensile and structural properties of the composite film were investigated. Also, temperature variation of dynamic-mechanical parameters of cassava starch/bagasse composites was investigated by Dynamic Mechanical Analysis (DMA) test. The size and concentration of bagasse were significantly influenced the physical properties of cassava bagasse. There were also increases- in thickness, water solubility, and water absorption of cassava bagasse. There were reduction of water content and density of the film. However, there was no significant effect of adding bagasse on thermal properties. X-ray diffraction (XRD) studies indicated increase in crystallinity of the composites with increase in fiber content. SEM micrographs indicated that the filler was incorporated into the matrix. Films with a small size of bagasse showed better compact structure and homogeneity surface. On the other hand, films with big size and higher concentration of bagasse exhibited more heterogeneous surfaces. The modulus and maximum tensile strength of composite films were increased from 69.03 to 581.68 MPa and 4.7 to 10.78 MPa respectively. Addition of 6 % bagasse was the most efficient reinforcing agent owing to its remarkable physical and mechanical properties. The composites prepared by using cassava for both matrix and reinforcement increased the significance of the remaining residue of starch extraction.

**Keyword:** Cassava film; Bio-composite; Cassava bagasse; Natural fillers; Mechanical properties