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FORMULATION & CHARACTERIZATION OF CELLULOSE BASED FILMS FROM SUGARCANE BAGASSE MODIFIED WITH PECTIN FOR THE POTENTIAL BIODEGRADABLE PACKAGING APPLICATION

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ABSTRACT

FORMULATION & CHARACTERIZATION OF CELLULOSE BASED FILMS FROM SUGARCANE BAGASSE MODIFIED WITH PECTIN FOR THE POTENTIAL BIODEGRADABLE PACKAGING APPLICATION

The escalating ecological concerns related to the use of petroleum-based polymers has necessitated the creation of bioplastics made from agricultural waste. This study focuses on the modification of cellulose from sugarcane bagasse using pectin with the aim of producing bioplastic films. For this purpose, sugarcane bagasse was chemically treated with hydrogen peroxide and sodium hydroxide to extract cellulose. This process was confirmed by FTIR analysis which showed characteristic cellulose functional groups indicating the removal of lignin and hemicellulose. Bioplastic films were made from cellulose and different pectin concentration. In this study, commercial pectin powder derived from citrus peel was used. It was mixed with sugarcane bagasse cellulose that had been extracted from sugarcane bagasse at various weight ratios to study pectin's influence on the final bioplastic films. The weight ratios of cellulose to pectin used were 5:0 (CP0), 4:1 (CP20), 3:2 (CP40), 2:3 (CP60), 1:4 (CP80), and 0:5 (CP100). These ratios representing 0% to 100% with increasing pectin concentrations, were named to reflect the formulation compositions. The final films were assessed for water absorption, mechanical strength, thickness, and opacity. The most opaque film was found at CP100 which suggests pectin concentration directly correlates to

increased opacity. CP60 yielded the thickest film, and CP100 exhibited maximum tensile strength at 3.2688 MPa. Also, absorption of water increased with pectin content until it peaked at CP80 (82.14%) and then decreased at CP100 (62.49%). These findings demonstrate that the cellulose-pectin composite films have potential application as biodegradable packaging materials possessing enhanced physiques and moisture resistance.

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