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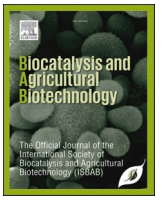

Effect of processing parameters on cellulose content extracted from pineapple leaf

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ABSTRACT

The development of dielectric materials from natural fibers of high cellulosic materials could potentially reduce environmental pollution and human health risk due to their biodegradability and non-carcinogenic properties. Comprehending the important process parameters is always challenging in material development to produce a dielectric material with great performance. Therefore, this research aims to evaluate the effect of processing parameters on cellulose extraction from pineapple leaves and determine the most significant parameters contributing to the extraction process and its corresponding permittivity value. The soda pulping method was used in cellulose extraction, and the content was analyzed by the Kurschner-Hanack method. The one-factor-at-a-time analysis was adopted to study the effect of pulping time on cellulose content while keeping the other parameters constant. The two-level factorial analysis was used to determine the significant parameters and the best conditions for the cellulose extraction with pineapple leaf to soda ratio (1:5 and 1:10), soda concentration (5 and 10 wt%), temperature (60 and 100 °C), and pulping time (46–75 min) as processing parameters. The results showed that the pineapple leaf to soda ratio was the most significant parameter in cellulose extraction. A maximum cellulose value of 40.51% was obtained at 1:5 pineapple leaf to soda ratio, 10 wt% soda concentration, 100 °C temperature, and 75 min of pulping time, contributing to a 1.6626 permittivity value. Therefore, the best extraction conditions and significant process parameters determined in this study can be used to tailor the parameters to the desired conditions for a higher cellulose yield and permittivity value.

1. Introduction

The booming demand for fresh fruits with increasing population density has caused an upsurge in recent consumption patterns. Rich in vitamins and fibers, pineapple (*Ananas comosus*) is among the fresh fruits in continuous supply and demand across the globe. Pineapple presents the most promising fruit demand in Malaysia's domestic and export markets (Nazri and Pebrian, 2017), as proven by its substantial plantation areas of more than 17,601 ha (Jenny, 2018). It is also ranked second after mango as the most important tropical fruit, followed by papaya and avocado (Altendorf, 2019). Pineapple is the most traded tropical fruit globally. Its consumption is projected to grow in the coming years due to rising household incomes and population growth coupled with the rapid expansion of

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