

Isolation and Characterization of Cellulose from Different Petiole of Plants: A Comparative Study on Isolation of Cellulose between Tongkat Ali and Curry Leaves

Nur Edlin Shezrin Mohammad, Maryam Husin

Structured Abstract

Background: Cellulose, the most abundant organic compound on Earth, is a vital structural component in plant cell walls. This study explores the untapped potential of tongkat ali and curry leaves petioles for cellulose extraction. While these petioles are often overlooked in industries, their abundance makes them promising sources for sustainable cellulose production. By employing alkaline and bleaching treatments, cellulose will be isolated and characterized using FTIR, XRD, and SEM techniques. The findings aim to contribute to eco-friendly practices, offering valuable insights for industries reliant on cellulose, such as textiles and paper, and fostering a shift towards sustainable materials.

Methods: Curry leaves and tongkat ali petioles were processed for cellulose extraction through alkaline and bleaching treatments. Raw materials underwent washing, heating, filtration, and drying processes. Alkaline treatment utilized 4 wt% NaOH at 60°C, followed by drying. Subsequent bleaching involved 5 wt% H₂O₂ at 70°C, achieving a pH of 4.5-4.8. The resulting cellulose samples, labeled CTA and CCP, were characterized using FTIR, XRD, and SEM techniques. Additionally, lignocellulosic composition and yield were determined.

Results: The research applied alkaline and bleaching treatments to curry and tongkat ali petioles, inducing significant color changes indicative of successful lignin removal. CTA exhibited a purer cellulose profile, confirmed by FTIR, with enhanced crystallinity (71.79%) compared to CCP (59.45%) shown through XRD. SEM portrayed improved cellulose morphology in tongkat ali, further validating its purity and enhanced crystallinity. Lignocellulosic composition analysis revealed tongkat ali having higher cellulose content than curry petiole which is 25.63% and 19.2% respectively. These findings showcase the potential of eco-friendly cellulose extraction from these plant petioles, contributing to sustainable material development.

Conclusion: In conclusion, the successful extraction and characterization of cellulose from Tongkat Ali and Curry Petiole highlight their potential as eco-friendly and sustainable sources. The removal of lignin and hemicellulose through alkaline and bleaching treatments enhances the environmental advantages of utilizing these plant petioles for cellulose production, promoting eco-friendly practices in material development.

Keywords: Cellulose, alkaline, bleaching

*Correspondence: marya911@uitm.edu.my

Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia