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Optimizing the reaction parameters for synthesizing carboxymethyl cellulose from *Hyphaene thebaica* (Doum palm) leaves

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The current investigation focuses on optimizing reaction conditions for preparing carboxymethyl cellulose (CMC) using a new source *Hyphaene thebaica* leaves. The CMC produced under optimal conditions has been subsequently characterized by ^{1}H NMR, FTIR and TGA techniques. Various solvent mixtures, including a combination of ethanol and isopropanol have been employed in the study. Additionally, different temperatures, reaction durations, and quantities of monochloroacetic acid (MCAA) have been utilized. The highest degree of substitution (DS) has been found to be 1.16. This result has been achieved by reacting MCAA with cellulose at a molecular ratio of 1:4.5 for 3 hours at 65°C using a solvent combination of (1:1). The produced CMC has an exceptionally unique physical characteristic creamy color and solubility (92%). The presence of a carbonyl group absorption signal in FTIR at 1734 cm^{-1} indicates the production of CMC. In addition, the application of thermogravimetric analysis (TGA) demonstrates that carboxymethyl cellulose exhibits lower thermal stability in comparison to native cellulose.

Keywords: *Hyphaene thebaica*, Cellulose, CMC

The trend of utilizing materials that are based