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OPTIMIZATION OF SUGAR RECOVERY FROM RAPESEED STRAW PRETREATED WITH FeCl₃

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Highlights

- Sugars from FeCl₃ pretreatment of rapeseed straw are assessed for the first time
- 70% of sugars in rapeseed straw were recovered with FeCl₃ pretreatment
- 100 g dry rapeseed straw yielded 37.8 g sugars after FeCl₃ pretreatment
- FeCl₃ enabled pretreatment at mild conditions compared to other methods

ABSTRACT

In this work, rapeseed straw was pretreated with FeCl₃ to achieve high sugar recoveries. Temperature (120–160 °C), and FeCl₃ concentration (0.1–0.3 M) were selected as factors and modified according to a central composite experimental design. The pretreatment conditions were expressed using the combined severity, which ranged from -0.12 to 2.29. Considering a double criterion that maximizes simultaneously the recovery of hemicellulosic sugars in the liquid fraction from pretreatment and the enzymatic hydrolysis yield, the optimal conditions were found to be 138 °C and 0.25 M salt concentration. The FeCl₃ pretreatment of rapeseed straw under these optimized conditions resulted in 75% hemicellulosic sugar recovery and 53% enzymatic hydrolysis yield. Thereby, 100 g dry rapeseed straw yielded 37.8 g sugars, equivalent to 70% maximum potential sugar in rapeseed straw.

Keywords: biorefinery, lignocellulosic biomass, metal salt pretreatment, response

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