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RESEARCH PAPER

Optimization of fermentation parameters using response surface methodology for ethanol production from pretreated cumbu napier grass

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ABSTRACT

The optimization of fermentation parameters for ethanol production by elite thermo tolerant yeast *Kluveromyces marxianus* was investigated in simultaneous saccharification and fermentation process using pretreated cumbu napier grass. The physical chemical characterization of the substrate expressed that the cellulose content was about 48.7 per cent and the hemicelluloses content was 20 per cent. The fermentation parameters such as commercial cellulase concentration, pH, temperature and fermentation time using the RSM were optimized for enhancing ethanol yield using central composite design. The optimal level of each parameter for maximum ethanol yield by the thermo tolerant yeast was determined. From the analysis conducted by Design Expert software version 8.0.7.1, the optimum combinations were commercial cellulase enzyme concentration, pH, temperature and fermentation time of 20 FPU g^{-1} substrate, 5, 42.5°C and 108 h. Under optimum conditions, the maximum conversion efficiency predicted by the model was 32.6 g l^{-1} of ethanol. The model computed for R^2 value was 0.9443 per cent indicating that it was appropriate and could be useful to predict the levels of varaibles to achieve maximum ethanol yield. Validation of the predicted results were done and the experimental values correlated well with that of predicted results.

Key Words : Bioethanol, Optimization, Response surface method, Central composite design

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