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Comparative study of dilute acid pretreatment techniques for fermentable sugar production from sugarcane leaves (*Saccharum officinarum*)

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Agricultural biomass such as sugarcane leaves are a potential feedstock for biofuel production. Annually, approximately 1.6 billion tons of sugarcane is produced and the leaves are disposed either by landfill dumping or burning which has serious repercussions for the environment (Jutakanoke et al., 2012). This paper examines the pattern of release of xylose and glucose from sugarcane leaves subjected to various acidic pretreatment regimes of HCl, H_2SO_4 and HNO_3 under varied input parameters of acid concentration, solid to liquid ratio, treatment time and temperature. The Response Surface Methodology was used to generate six process models for xylose and glucose prediction with respect to the acid type. The Analysis of variance (ANOVA) showed that all models were significant with coefficients of determination (R^2) ranging between 0.78 and 0.93. Process optimization using the developed models and experimental validation gave xylose and glucose yields of 78 g/L and 11.48 g/L, 50.75 g/L and 7.15 g/L, 30.82 g/L and 3.99 g/L for HCl, H_2SO_4 and HNO_3 based pretreatment respectively. Thus HCl based pretreatment with acid concentration of 4.90%, solid to liquid ratio of 47.26%, treatment time of 84 mins and temperature at 99°C gave the highest yield of fermentable sugars with a xylose to glucose ratio of 6.8: 1. These data showed a significant improvement with a 15 fold increase in xylose and glucose compared to previous studies and highlights the suitability of sugarcane leaves as an excellent source of fermentable sugars for the production of biofuels.

Biography

Preshanthan Moodley is a Master's of Science student studying microbiology at the University of KwaZulu-Natal in South Africa. He obtained his BSc degree in 2013 majoring in microbiology and biochemistry and has also obtained his BA Honors degree in filmmaking in 2009. Currently, his area of research includes biofuel production from pre-treated agricultural waste residues while focusing on bio-hydrogen from sugarcane leaves. His interest in this field made it possible for his honors thesis to be published in a reputable international journal. His future research interests include expanding upon different biofuels such as methane and ethanol.

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