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Bioethanol production from pineapple leaf waste: A partially consolidated bioprocessing approach

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Dwindling fossil fuel reserves and the detrimental effects on the environment due to their excess utilization have stimulated the scientific community to search for alternative energy resources. Biofuels derived from lignocellulosic feedstock can be used without much modification in the existing internal combustion engines. The present study is one such attempt towards bioethanol production from pineapple leaf waste through partially consolidated bioprocessing (PCBP) in a single reactor. The substrate was treated with the concoction of laccase and holocellulase (cellulase and xylanase) produced from *Pleurotus djamor* and *Trichoderma reseei* RUT C30 respectively, for the removal of lignin and production of reducing sugars. This step is followed by fermentation with *Saccharomyces cerevisiae* for ethanol production.

The simultaneous pretreatment and saccharification (SPS) was performed at 50 oC, which was reduced to 37 oC for fermentation. The optimization of the process parameters for ethanol production was carried out using central composite design (CCD) based response surface methodology (RSM). Upon validation, maximum ethanol concentration of 7.7% (v/v) was obtained from PCBP at a solid loading of 27.25% (w/v) in 23 h. The efficiency of PCBP was assessed through mass and energy balance of the process, structural characterization and porosity analysis of the biomass. Utilization of pineapple leaf waste, a cheap agro-industrial waste residue for ethanol production through partially consolidated bioprocessing is an endeavour towards eco-friendly and cost effective bioethanol production.

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