Optimization of Enzymatic Saccharification to Improve Glucose Recovery from Spent Coffee Grounds

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Coffee has increased consumption and the use of disposable plastic cups has also increased, resulting in soil and water pollution. Lactic acid is a raw material for polylactic acid, a biodegradable plastic. In this study, spent coffee grounds (SCG) were used as the feedstock for *Lactobacillus* fermentation to produce lactic acid. Statistical optimization was performed to derive pretreatment conditions using response surface methodology. The optimum conditions for alkali pretreatment of SCG were as follows: 75°C, 3% KOH and 2.8 h. Pretreated SCG were hydrolyzed to convert into fermentable sugar for lactic acid production. The optimum enzymatic hydrolysis conditions were as follows: enzyme loading of 30 FPU cellulase, 15 CBU cellobiase and 50 MNU mannanase based on 1 g biomass and time of 96 h. Fermentable sugar was recovered 1.6-fold higher than the control group by optimizing the saccharification process. SCG hydrolysates were used for lactic acid fermentation and the conversion rate was estimated to be 55.8%. The maximum lactic acid production based on 1,000 g SCG was found to be 101.2 g, a 1.6-fold improvement compared to the control group.