

Optimization of Pretreatment Process of Napier Grass for Improved Sugar Yield

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Abstract : Perennial grasses have presented interesting choices in the current demand for renewable and sustainable energy sources to alleviate the load of the global energy problem. The perennial grass Napier grass (*Pennisetum purpureum* Schumacher) is a promising feedstock for the production of cellulosic ethanol. The conversion of biomass into glucose and xylose is a crucial stage in the production of bioethanol, and it necessitates optimal pretreatment. Alkali treatment, among the several pretreatments available, effectively reduces lignin concentration and crystallinity of cellulose. Response surface methodology was used to optimize the alkali pretreatment of Napier grass for maximal reducing sugar production. The combined effects of three independent variables, viz. sodium hydroxide concentration, temperature, and reaction time, were studied. A second-order polynomial equation was used to fit the observed data. Maximum reducing sugar (590.54 mg/g) was obtained under the following conditions: 1.6 % sodium hydroxide, a reaction period of 30 min., and 120°C. The results showed that Napier grass is a desirable feedstock for bioethanol production.

Keywords : Napier grass, optimization, pretreatment, sodium hydroxide

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