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Saccharification of rice straw using highly thermophilic cellulolytic enzymes

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Bioethanol is a safe and renewable energy source; recently in spotlight since it can be obtained utilizing agricultural waste products. Keeping this challenge in mind, an experiment was conducted to optimize conditions for bioconversion of rice straw into fermentable saccharides. Pretreatment of locally collected rice straw was done by different chemical (alkaline, BSA treatment, microwave and autohydrolysis) methods for the maximum production of saccharides by the process of enzymatic saccharification. Biomass pretreated by autohydrolysis resulted in enhanced cellulosic content and reduced lignin content. Therefore, enhanced bioconversion of 1.16% was observed by enzymatic hydrolysis. A number of physical as well as chemical factors were optimized for the improved yields of saccharification using rice straw. Substrate loading of 0.75%, sequential addition of cellulolytic enzymes, incubation temperature (80°C), shaking speed (120 rpm) resulted in 17.7% saccharification. 75 units/ml of endoglucanase with an incubation time of 2 hours, 100 units/ml of exoglucanase with a residence time of 2 hours and 100 units/ml of β-glucosidase for the maximum hydrolytic activity of 3 hours gave maximum bioconversion of 35%. The addition of endoglucanase preceding exoglucanase gave better saccharolytic efficiency as compared to the reverse addition of enzymes.

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