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A challenging attempt towards utilization of non-edible lignocellulosics for cost-effective biobutanol production

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Global raise in the living standards of the society throughout the world has created a huge demand for transportation fuel. Conventionally energy demand used to be met through the use of fossil fuels but due to environmental concerns, sustainable sources of fuels are being researched upon nowadays. In this venture, biofuels have gained immense popularity since they are carbon neutral and has the potential to fulfill the demand. Nowadays pretreatment and saccharification of lignocellulosics is performed sequentially in order to obtain fermentable sugar for biofuels production. In the present study, pretreatment and saccharification was investigated concomitantly to obtain reducing sugars from bamboo using laccase and cellulases extracted from solid state fermentation of *Pleurotus* sp. and *Trichoderma reesei* respectively. One of the main advantages of this process is the overall time reduction since pretreatment and saccharification is conducted simultaneously. Laccase assists in increasing cell wall permeability by degrading the lignin and thus facilitated the diffusion of enzymes into the cell wall to cause hydrolysis of holocellulose for the production of fermentable sugars. Process parameters governing the system viz., temperature, incubation time, pH, cellulase: laccase ratio in the enzyme cocktail and solid loading were optimized using response surface methodology thus producing a maximum reducing sugar content of 75.45 g/L. HPLC analysis revealed that broth has mixtures of glucose (36.89%), pentoses (24.29%) and cellobiose (38.81%). The potential of these sugars was analyzed using *Clostridium beijerinckii* by converting the sugar rich broth into butanol. Clostridia have the capability to utilize C6, C5 and disaccharide sugars efficiently into butanol. Thus the present work showed the feasibility of the process for biobutanol production from bamboo.

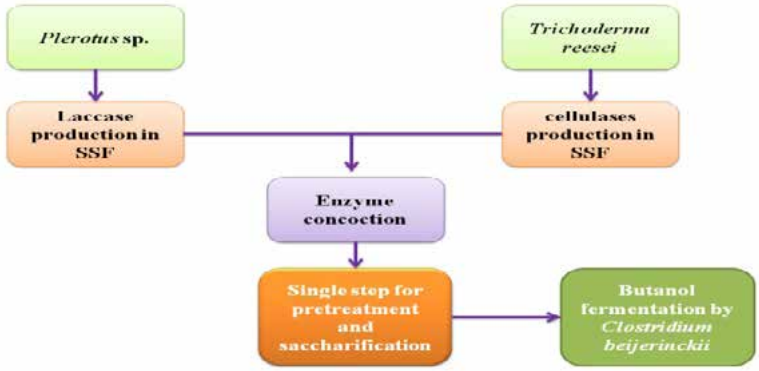

Figure 1: Schematic representation of the process

Biography

Sanjeev Kumar is a PhD student working under the esteemed guidance of Prof. Rintu Banerjee at Advanced Technology Development Center, Indian Institute of Technology, Kharagpur, India. He is working on second generation biobutanol production using *Clostridium beijerinckii*.

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