

## Lignocellulosic waste conversion into biofuel

Lalit Kumar, Dharm Dutt and C. H. Tyagi

Biotechnology Laboratory, Department of Paper Technology, Indian Institute of Technology Roorkee, India

Due to finite petroleum reserves and the ever increasing energy consumption by the developed as well as developing countries has created an international unease. This international concern has led to the need for the search of other alternatives such as solar, water and wind energy conversion. A thing what matters is: Are we only going to consume what is available to us or being the most developed species can we make out something from the consumed or which is considered as waste? Lignocellulosic biomass present on our earth, consisting of cellulose, hemicellulose and lignin is considered to be as "Waste". This waste biomass can easily be converted into biofuel with the help of different chemical as well as biochemical conversion. Current strategies to delignify lignocellulosic materials, includes mild acid and alkali treatment, which often lead to the production of a number of fermentative inhibitors including that of Yeast. These inhibitors include 5-hydroxymethylfurfural and furfural, which are produced by the dehydration of hexose and pentose sugars, respectively. The significant improvements can be made if a process is developed to reduce toxic compound during lignocellulosic pretreatment and increase conversion of plant cell wall polysaccharides to monosaccharides. Lignocellulosic material can efficiently be converted into fermentable sugars through enzymatic hydrolysis using cellulases and hemicellulases without the conversion of inhibitors of yeast fermentation. Xylan, major polysaccharide of hemicellulose, requires the action of several hydrolytic enzymes due to its heterogeneity and the complex chemical structure. Xylanase can potentially be use in pretreatment of lignocellulosic material, mainly hemicellulose for conversion of fermentable monosaccharides.

### Biography

Lalit Kumar is pursuing his PhD from Department of Paper Technology, IIT Roorkee, Uttarakhand, India. His research work is mainly on xylanase, an industrially important enzyme. He is a Post graduate in Botany with Gold Medal and has qualified CSIR-JRF-2007, UGC-CSIR-2010 and GATE -2008 in life science. His research interest includes molecular characterization, structure-function relationship of enzymes that is useful for industrial purpose. The structure determination of this protein will be helpful to improve the stability of the enzymes by mutational studies and thus modulate the function of these important enzymes.

lalitphdiitr@gmail.com

## Solid state fermentation of *Antigonum leptopus* leaves for cellulase production from *Trichoderma reesei*

P. Siva Rasagnya, P. Padma Priya and D. Sri Rami Reddy

Center for Biotechnology, Department of Chemical Engineering, Andhra University, India

Cellulase production: the most important step in the production of ethanol, single cell protein and other chemicals from renewable cellulosic materials. To date, the production of Cellulase has been widely studied in submerged culture process. Major impediments to exploiting the commercial potentials of cellulases are the yield, stability, specificity and the cost of the production. In the past decades only very little has been given to solid state fermentation. The applicability of the product, the high product concentration and reduce the cause of dewatering make SSF a promising technology for Cellulase production.

In the present study, cellulase enzyme was produced from *Trichoderma reesei* using *Antigonum leptopus* leaves as a substrate in solid state fermentation. Three different microorganisms were procured, which include *Aspergillus fumigatus*, *Trichoderma reesei* and *Trichoderma veridae* were studied for their ability to produce Cellulase enzyme on different substrates namely *Antigonum leptopus* leaves, maize corn husk, grape pomace and saw dust. It was observed that *Trichoderma reesei* and *Antigonum leptopus* leaves show higher yields compared to the other microbes and substrates evaluated. 24hrs seed culture of *Trichoderma reesei* gave higher Cellulase activity when compared to spore suspension and seed cultures of other fungi. Process parameter were optimized such as incubation time 72hrs, incubation temperature 30°C, particle size 180 µm, substrate weight 6 gms, pH-7.0 were found to be optimum conditions for maximum Cellulase product.

rasuraghs@gmail.com