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Saccharification of Agroresidues by a Thermophilic Lignocellulolytic Microbial Consortium: From Waste to Value

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Abstract—*Plant lignocellulosic biomass which is the most abundant biopolymer on earth has been long recognised as an important feedstock for the production of several value-added products. In nature, lignocellulosic biomass is degraded with the cooperation of many microorganisms, producing a variety of cellulolytic and hemicellulolytic enzymes under aerobic and anaerobic conditions .The biodegradation of cellulosic biomass through the use of microbial co-cultures or complex communities has been proposed as a highly efficient approach for biotechnological application, since it avoids the problems of feedback regulation and metabolite repression posed by isolated single strains. Robust enzymatic cocktails from such microbial consortia to produce fermentable sugars from lignocellulosic biomass are highly desirable in industrial-scale processes where harsh heat and extreme pH pre-treatments of the lignocellulosic raw materials impose limitations on the optimal functioning of enzymes. Moreover, thermophilic bacterial consortia could be a potential source of thermostable cellulases and hemicellulases that are of immense utility in industries and hence, are currently a major topic of interest in research.*

In this study we report the development of a thermophilic lignocellulolytic microbial consortium from a compost sample by successive sub-cultivation in liquid minimal media with an agroresidue as the sole carbon source at 60°C.The consortium was found to be a repository for different glycoside hydrolases which showed better activity at 60°C as compared to 37°C.This thermophilic enzyme cocktail was then used for the saccharification of several common agroresidues with significant yield of fermentable sugars.

Keywords*: Lignocellulose deconstruction, thermophilic bacterial consortium, saccharification.*