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Mission: Butanol from sugarcane bagasse

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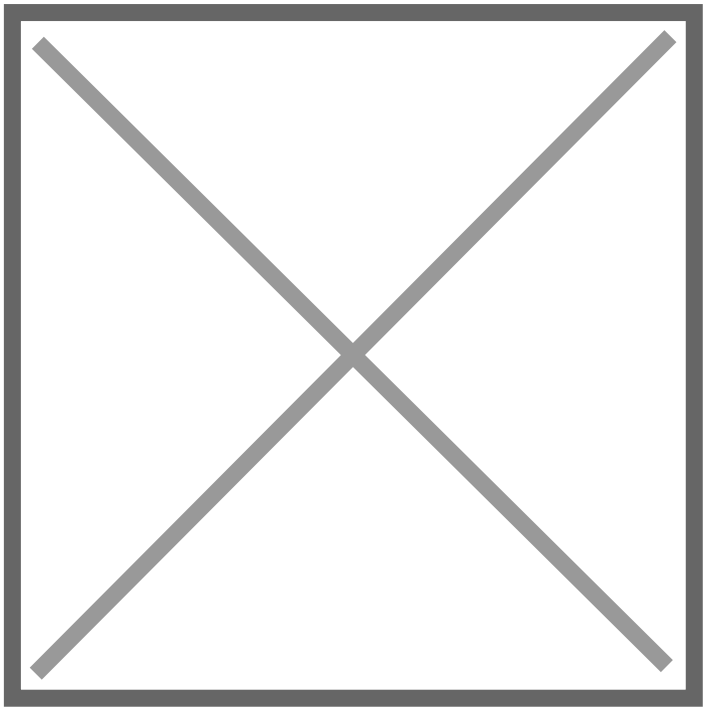
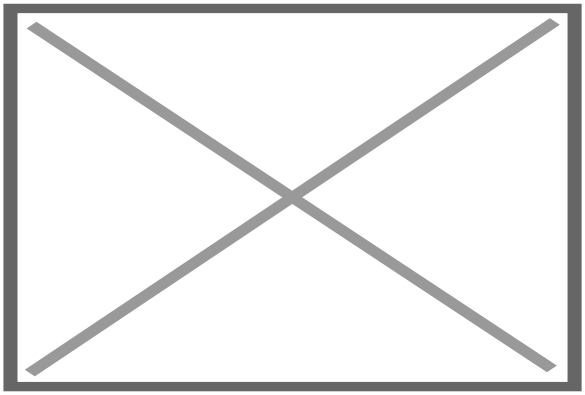




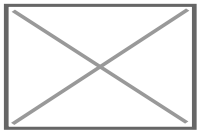
New Delhi-based The Energy and Resources Institute and Bharat Petroleum are executing a unique joint project on butanol production from lignocellulosic biomass of abundant sugarcane waste

In the recent past, lignocellulosic biomass gained substantial attention as feedstock for production of biofuelsas it is renewable and inexpensive energy source. Moreover, the accumulation of lignocellulosic wastes in vast quantity also poses environmental problems. Therefore, the sugarcane bagasse that are rich in lignocellulosic biomass and available in vast amount in India can serve as potential feedstock for ethanol and butanol production.

Considering the fact that around 300 million ton of sugarcane are is produced by India per annum, the proposal on production of butanol from sugarcane bagasse was initiated jointly by The Eneregy Research Institute (TERI) and Bharat Petroleum. Aimed at developing microbial-based technology for biobutanol production, the collaborative project received the Biotechnology Industry Partnership Programme (BIPP) funding of around 48 lakh from the Department of Biotechnology (DBT), Ministry of Sciences and Technology, Government of India.

At present, TERI is involved in the saccharification of C6 fermentable sugars from lignocellulosic biomass and co-fermentation of C5 and C6 sugars for enhancement of butanol yield efficiency.

In this context, enzymatic hydrolysis of lignocellulosic biomass by cellulase and hemicellulase enzymes offers promising approach because of their moderate operating conditions, higher conversion efficiencies, high sugar yield and lower environmental impact. Specific microorganisms belonging to the group of bacteria and fungi have got unique capability of producing these enzymes.



According to Dr Banwari Lal, director, environmental and industrial biotechnology division, TERI says, Ã¢â?¬Å?This project is aimed to study the process for butanol production from sugarcane bagasse by simultaneous saccharification and co-fermentation through the employment of robust microbes having potential saccharification of cellulose and hemicellulose. Specific milestones include optimization of process parameters for maximization of C5 and C6 fermentable sugar recovery by selected robust microbes including optimization of process parameters for co-fermentation of C5 and C6 sugars to maximize butanol yield from sugarcane bagasse.Ã¢â?¬?

The way forward The potential advantages of butanol such as lower vapor pressure, higher energy density, lower water solubility, less corrosiveness and easy addition to gasoline than ethanol, gained global attention for use as a possible gasoline blendstock and an alternative to ethanol. The project has been successful in identifying robust microbes, which can efficiently accomplish the enzymatic saccharification of lignocellulosic biomass at mild conditions. Currently, research work is in progress to optimize the process parameters to increase C5 and C6 sugar recovery as well as to enhance the butanol yield efficiency.

Dr Lal says, Ã¢â?¬Å?This project is quite promising for us and holds importance as it deals with gaining insight into the enzymatic saccharification of recalcitrant lignocellulose biomass for C5 and C6 fermentable sugar recovery. It serves as a suitable cost effective feedstock for butanol fermentation.Ã¢â?¬?

Rahul Koul in New Delhi