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An integrated approach for utilization of broken rice for bioethanol production

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Globally, the demand of energy from sustainable sources is a growing issue. Energy generation from petroleum and coal is gradually depleting due to scarcity of natural resources. On the contrary, generation of waste bioresources are increasing at an alarming rate. Apart from this, generation of organic waste leads to the production of Greenhouse Gases like methane in abundance. To combat such global issues conversion of waste biomasses to the production of energy in a sustainable manner is a smart choice for the researchers. In this scenario, the present research work focuses on utilization of waste broken rice for bioethanol production. The USP of this work is the utilization of starchy rich damaged grains which makes the process cost effective as the price of broken rice is ten times less than the fine grade rice. Production of bioethanol gets initiated by liquefaction of broken rice to release the components of starch (amylose and amylopectin) into the media. Thereafter, simultaneous conversion to reducing sugar and its utilization through fermentation occurs for bioethanol production. This integrative approach reduces a step and also the processing time to 15 h. The reason behind such reduction in processing time is due to the use of a novel hyper-active α-amylase from *Bacillus amyloliquefaciens* used for saccharification. For optimizing the process, process parameters viz., solid loading, inoculum volume, enzyme concentration, incubation period were considered. After performing the experiments an ethanol concentration of 13.6% (v/v) was obtained. Bioethanol produced bears the potential to replace gasoline and can be used in food industries. Further, research has also been carried out using the residual fermented biomass (also known as dried distillery grain with solubles) for its value-added application in other industries.

Recent Publications:

1. Gohel Vipul and Duan Gang (2012) No-cook process for ethanol production using indian broken rice and pearl millet. International Journal of Microbiology. 2012:1-9.
2. Moongngarm A (2013) Chemical compositions and resistant starch content in starchy foods. American Journal of Agricultural and Biological Sciences. 8(2):107-113.
3. Suresh K, Kiran Sree N and Rae V L (1993) Utilization of damaged sorghum and rice grains for ethanol production by simultaneous saccharification and fermentation. Bioresource Technology. 68(3):301-304.
4. Gangadharan D et al. (2008) Response surface methodology for the optimization of alpha amylase production by *Bacillus amyloliquefaciens*. Bioresource Technology. 99(11):4597-4602.

Biography

Mohan Das is currently pursuing PhD from Indian Institute of Technology, Kharagpur, India. He is working in the area of Food Biotechnology.

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