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Simultaneous saccharification and fermentation of waste broken rice for bioethanol production

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Global energy crisis is a burning issue. To address such issues the different problems associated with energy supply not only by emphasizing global warming but also the environmental issues such as air pollution, acid precipitation, ozone depletion, forest destruction and emissions from different radioactive elements are given utmost priority so that the energy and environment issues can be taken into consideration in a single goal. In this context the present work emphasizes the waste from agricultural farm house practices and/or agro based industries after processing the starchy rich cereals and grains. This includes discoloration, breakage, cracking, attack by fungi, insect damage, chalky grain, partial softening by being damp, dirty and bad smell etc. The damaged grains used are ten times cheaper than fine quality and can be utilized for bioethanol production considering the high starch content (60-80% of the dry matter). The amount of grain utilised neither for food, nor for feed purposes has grown in recent years in the tune of 10% increment annually. The process of bioethanol production from rice waste includes liquefaction to extract starch from rice followed by amylase treatment to hydrolyze starch for fermentable sugars production which can be further fermented to produce bioethanol. In addition, the latter two stages can be integrated into a single process, simultaneous saccharification and fermentation (SSF) which has the potential to cut down the overall time requirement keeping the overall yield of bioethanol constant. Current research is focused on the process of bioethanol production from rice waste via liquefaction and simultaneous saccharification and fermentation. In the study, saccharification was performed by α -amylase extracted from *Bacillus amyloliquefaciens* while fermentation agent employed was *Saccharomyces cerevisiae*. For optimizing the process for maximum ethanol production, process parameters viz., solid loading, incubation time, inoculum volume and enzyme concentration were selected. Through experimentation, maximum ethanol concentration of 13.1% (v/v) was obtained after 15 h of processing time. The bioethanol obtained through this process can be used for potable purposes and can also be used as a fuel with the potential of replacing gasoline.

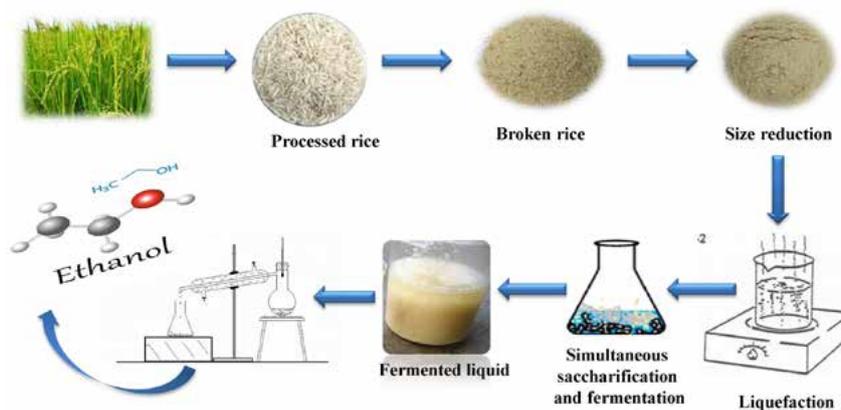


Fig 1: Schematic representation of bioethanol production from broken rice

Biography

Mohan Das is currently pursuing his PhD under the guidance of Prof. Rintu Banerjee from Indian Institute of Technology, Kharagpur, India. He is working in the area of Food Biotechnology.

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