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Simultaneous Extraction and Fermentation of Mahua (Madhuca latifolia) Flowers to Ethanol.

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Abstract

Mahua (Madhuca latifolia) flowers are abundantly available in the north eastern and central parts of India to the extent of about one million tonnes/annum and contain 50-55% sugars, 96% of which are fermentable to ethanol by Saccharomyces cerevisiae. The present studies describe the operation of packed bed, total recycle reactor to transform the sugars present in mahua flowers into ethanol where sugar extraction and fermentation occur concurrently. The system has been operated in a cyclic manner by replacing the packed bed of the flowers every 36 hours. Under varying experimental conditions, 80-92% of the total sugars were cconsumed giving a fermentation yield ($Y_{P/S}$) of 0.49 (± 2%) based on sugars consumed.

The flowers during the extraction/fermentation cycle also get loaded with the yeast cells, thus resulting in increased nitrogen content of the residue. From an initial 0.84% nitrogen content in the dried flowers, the residue (12% dry weight of the original flowers) contains 1.48% nitrogen; which can serve as an excellent cattle feed.

Reduction of Nucleic Acid Content in Yeast Cells by Aspergillus candidus RNase Treatment

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It has been shown that uptake of more than two grams of nucleic acids (NA) per day by humans caused uricaemia which may lead to gout and other complications. Hence it is important to reduce the NA content of single cell protein to facilitate higher uptake of this novel protein. In this study, a method was developed for decreasing the NA content of yeast biomass of Saccharomyces and Candida strains by treating with a potent RNase from A.candidus M16a. Yeast cells were either heat treated (95°C for 5 min) or treated with chloroform followed by heat treatment (62°C). Maximum leakage of NA was observed when the incubation temperature was 55°C, pH was 4.5 and the enzyme-to-cell ratio was 1:5000 (W/W). About 80-85% of the total NA content of the cells was reduced by this method under optimal conditions. The products of hydrolysis of RNA were fractionated into four mononucleotides by ion-exchange column chromatography on Dowex 1-8(Cl^-).