RESEARCH PAPER

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Ethanol production by *Saccharomyces cerevisiae* from rice bran hydrolysates of *Bacillus pimilus* and *Pseudomonas aueruginosa*

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The objective of this work was to study the potential effect of two bacterial xylanase enzymes for ethanol production. The selection of *Saccharomyces cerevisiae* strains to ferment sugars obtained from the rice bran at temperatures above 35^{0}C with high ethanol yield has become a necessity. In this work *S.cerevisiae* strains were screened for their ability to grow and ferment xylose in the culture filterate produced by *Bacillus pumilus* and *Pseduomonas aueruginosa*. The results obtained from this study showed that rice bran present, an excellent source for agro-residue based ethanol production.

Key words : Rice bran, Ethanol, Yeast, Fermentation

INTRODUCTION

Ethanol production is usually accomplished by chemical synthesis of petrochemical substrates and microbial conversion of carbohydrates present in agricultural products. Owing to the depleting reserves and competing industrial needs of petrochemical feed stocks, there is global emphasis on ethanol production by fermentation process. Increased yield of ethanol production by microbial fermentation depends on the use of ideal microbial strain, appropriate fermentation substrate and suitable process technology.

An ideal microorganism used for ethanol production must have rapid fermentative potential, improved flocculating ability, appreciable osmotolerance, enhanced ethanol tolerance and good thermo tolerance. Although no microbial strain has all these desirable qualities, few yeast strains have been found to possess appreciable characteristics for ethanol production (Panchal *et al.,* 1982 ; Hacking *et al.,* 1984).

Various strains of indigenous yeasts capable of producing ethanol have been isolated from different local sources such as molasses (Rose, 1976), sugar mill effluents (Anderson *et al.,* 1986) and local fermented foods (Ameh *et al.,* 1989) and fermented pineapple juice (Eghafona *et al.,* 1999). In most of these studies, the preferred candidate for industrial production of ethanol has been *Saccharomyces cerevisiae.* This yeast also has the ability to produce ethanol which is not contaminated by other products from the substrate. Rice bran is readily available agricultural waste with abundant carbohydrate content and other basic nutrients that can support yeast growth. In the present paper, utilization of xylanase containing xylose produced from *Bacillus pumilus* and *Pseudomonas aueruginosa* was used as the substrate for the growth of *Saccharomyces cerevisiaceae* and production of bioethanol.

MATERIALS AND METHODS

Yeast strain and media :

The yeast used in these studies was *Saccharomyces cerevisiae* known as bakers yeast was purchased from Sakthi Sugars, Coimbatore. The yeast culture was maintained in medium contained 20g of glucose, 20g of agar, 5g of peptone, and 5g of $MgSO_4.7H_2O$ per liter. The growth medium utilized in the liquid inoculation contained 50g glucose, 5g of yeast extract, and 1g of KH_2PO_4, 0.3 g of NH_4Cl and 2g of $MgSO_4.7H_2O$ per liter.

Inoculum preparation :

Cell suspension (10ml) prepared from 2 days old slant culture was inoculated into 100ml of medium and incubated at 30^{0}C for 48h on a rotary shaker. The cells were then collected by centrifugation. The inoculum concentration of 0.1 per cent (dry weight/volume) was used for the fermentation process.

Production of ethanol from agro residues (Rice bran):

Ethanol production was carried out in two steps (1) Saccharification of agro residues by bacterial enzymes (2) Fermentation of sugar rich hydrolysates obtained from the saccharification process by *Saccharomyces cerevisiae.*