Use Pennisetum alopecoider as Fermentation Substrate for Cellulosic-Ethanol Production.

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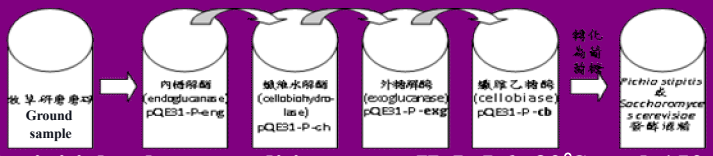
ABSTRACT

The study is to investigate the bioethanol production from *Pennisetum alopecoider* powder by using two-stage fermentation co-culturing systems of cellulolytic strain and ethanolic strain. First, we used ethanolic strain WLP041 and the cellulolytic strain *Bacillus subtilis* for the feasibility of co-culturing two-stage and period. The optimal hardening time of gel beads was 15 min, which has the ability to protect yeast to produce ethanol. The hydrolyzate and acid-treated powder with the period of co-culturing systems produced ethanol, after the third day found that the maximum ethanol production concentration was 1,266 mg/L, which was the highest in this experiment.

INTRODUCTION

According to different sources of raw materials bioethanol can be divided into three main categories, first category is the quality of sugar crops, the second category of starch crops, and the third type of cellulose or wood fiber raw materials. The strains used for the decomposition of aloe cellulose decomposition, to produce glucose. While using the strain *Saccharomyces cerevisiae* to co-fermentation, the use of some type of fermentation. Use microencapsulation technology, through a sustained-release coating yeast survey the optimizing fermentation conditions, improve alcohol production and purification, to reduce production costs and improve the bottleneck for some fermentation technology.

MATERIALS AND METHODS



The initial culture condition was pH 5~5.6, 30℃ and 150 rpm, and got higher ethanol yield. The result showed that in order to increase the ethanol production, the ethanol content was 652.3 mg/L under 10 g/L *P. alopecoider* powder. The results show that the immobilized yeast for ethanol production, after the third day found the maximum ethanol content is 1,106.9 mg/L.

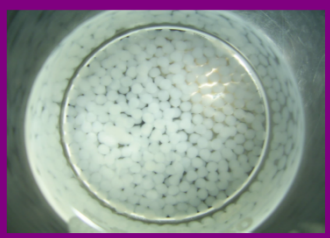


Fig. 1. The immobilized yeast.

Fig. 2. The powders of *P. alopecoider.*

RESULTS AND DISCUSSION

In the two-stage of co-culturing, we found that the maximum ethanol production concentration was 244.7 mg/L. In the period of co-culturing, the maximum ethanol production concentration was 257.9 mg/L. It was proved that the feasibility of period of co-culturing have higher ethanol yield. Secondly, *Saccharomyces cerevisiae* and *Trichoderma* sp. were co-cultured with ethanol production and use the immobilized technique.

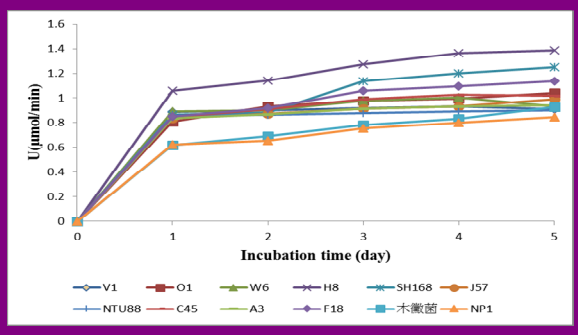


Fig. 3. The amount of residual sugar of each strains.

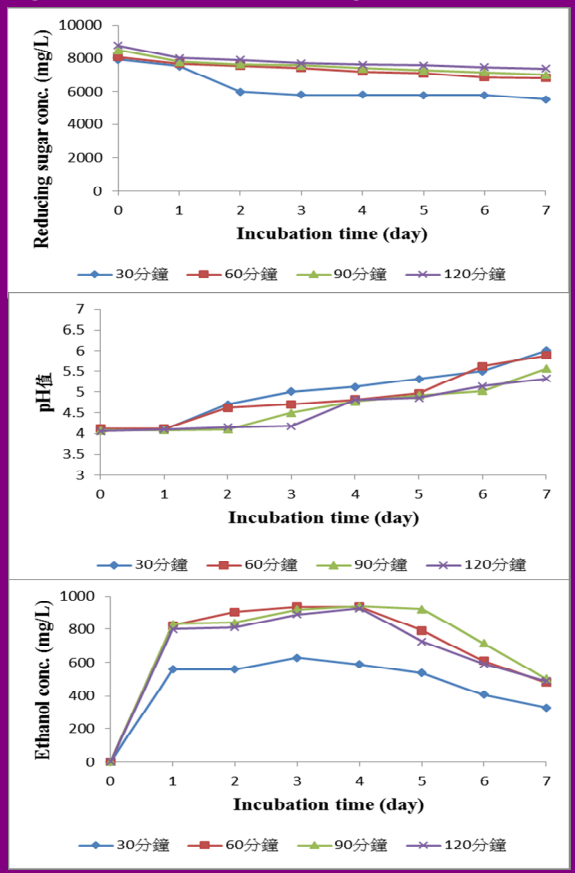


Fig. 4. Variation of reducing sugar, pH and Ethanol concentration in *P. alopecoider* solution.