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RESEARCH PAPER

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Production of Ethanol from *Ipomoea batatas* using *Saccharomyces cerevisiae*

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A study was carried out on yeast fermentation of sweet potato (*Ipomoea batatas*) using baker's yeast (*Sacchromyces cerevisiae*). The fermented sugar syrup (broth) was analyzed for yeast growth, alcohol content, reducing sugar, pH, soluble solids, volatile acids and total acidity using standard protocols. Yeast growth was also monitored. Results showed that pH values decreased with increased total acidity with concomitant increase in yeast growth (biomass) and alcohol contents of the fermenting sugar syrup. There were decreases in soluble solid contents, refractive indices of the fermenting medium. The reducing sugar in the *Ipomoea batatas* was lowest after 48 h of saccharification using *Sacchromyces cerevisiae* .The value recorded was 132 to 87 mg/100ml. Volatile acids (as acetic acids), increased with alcoholic fermentation. Fermentation of sugar syrup from *Ipomoea batatas* is associated with physical and chemical changes that occur in other form of fermentation alongside increased in biomass. The fermented *Ipomoea batatas* yielded ethanol contents of 11.5 to 53.0% (v/v).

Key words : *Ipomoea batatas*, Fermentation, *Saccharomyces cerevisiae*, Alcohol, Sugar syrup, Biomass.

INTRODUCTION

With the increasing value of petrochemical feedstocks, ethanol fermentation is bound to receive more attention (Ameh *et al*., 1988). The use of ethanol as an alternative motor fuel has been steadily increasing around the global scenario. It can be made synthetically from petroleum or by microbial conversion of biomass through fermentation and is used in the manufacture of drugs, plastics, polishes, plasticizers, perfumes, cosmetics, rubbers, accelerators and cellulose nitrate. Fermentation is one of the oldest processes known to man, and it is used in making a variety of products including foods, flavorings, beverages, pharmaceuticals, and chemicals (Gordon and Michael, 1979).

Ethanol is made from a variety of products such as grain, molasses, fruit, cobs, and shell; its production, excluding that of beverages, has been declining since the 1930s because of the low cost (Othman, 1981). It is one of the important industrial chemicals, can be produced extensively from *Ipomoea batatas*. The main constituents of this class of crop are carbohydrates (Chang *et al*., 1981; Cowling, 1976) that can be excellent energy source. This root vegetable qualified as an excellent source of vitamin A, C, B6, manganese, copper, dietary fiber, potassium and iron. It contains unique root storage proteins which had about one-third of internally produced antioxidant activity of *glutathione* (Hou *et al*., 2001). In this present study, *Ipomoea batatas*, which are readily available, were used for ethanol production.

MATERIALS AND METHODS

Isolation of yeast:

The *S.cerevisiae* was isolated from fermented grapes using yeast peptone glucose medium.

Formulation of fermentation medium:

The substrate namely sweet potato (*Ipomoea batatas*) was procured in a local market and the skin was removed. Then it was processed to formulate the medium through pasteurization followed by filtration of the syrup.

Fermentation:

In batch fermentation, the sterile syrup (200ml) was inoculated with 2% inoculum of *S. cerevisiae* in 500ml Erlenmeyer flask. The pH was adjusted to 4.5 and incubated in shaker at 110 rpm for 6 days at 30°C with intermittent collection of broth followed by biochemical analysis. At the end of fermentation, the alcohol was recovered by distillation and the content was determined by specific gravity method (AOAC, 1970).