

## Optimization and production of bioethanol from cashew apple juice using *Saccharomyces cerevisiae* culture by solar energy

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**ABSTRACT :** Ethanol fuels unlike petroleum are renewable and can be produced from locally available cashew apple fruit juice (variety Vengurla-4) grown in the Konkan region of Maharashtra, India. The production and use of ethanol in the country has the potential to generate income in the rural areas by boosting the agricultural sector thus bringing social economic development and environmental benefits. The objective of this study was to show the ways ethanol production. Production of ethanol involves two processes fermentation and distillation. Raw fermented cashew apple juice after fermentation was used for ethanol production. Distillation process using concentrating solar cooker having the total distillation rate per day of the system was 2230 ml for first distillation with average distillation efficiency of the system as 33.41 per cent that increase the ethanol percentage up to 18.6 per cent from initial 12 per cent. After second distillation the value of ethanol concentration obtained was 35.5 per cent. Due to higher temperature, the water also evaporated along with ethanol. So it was not possible to get higher concentration of ethanol. Specific gravity and acid value of the 35.5 per cent ethanol were found to be 0.947 and 1.044 mg KOH/g, respectively. These results indicate that cashew apple juice is a suitable substrate for yeast growth and the fermentation juice can be used for ethanol production.

**KEY WORDS :** Cashew apple juice, *Saccharomyces cerevisiae*, Fermentation, Distillation, Ethanol

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### INTRODUCTION

Energy plays a crucial role in modern life. The main problem of the 21<sup>st</sup> century is the increasing demand of fossil fuels but the storage strata is limited. Now day's alternative fuel like ethanol has more demand in developed and developing countries for fulfillment of requirement for fuel. However, due to increasing petroleum shortage, production of ethanol from renewable resources has received considerable attention (Ames, 2001). Ethanol is a clean burning renewable source that

can be produced from fermentation of glucose rich substrate (Yu and Zhang, 2004). In many part of the world demand for ethanol as an alternative fuel sources has steadily increased (Sheoran *et al.*, 1996). Which helps the world to secure its future supply of energy by reducing its dependency on fossil fuels? Ethanol fuel is produced by fermenting and distilling biomass with high sugar content. Ethanol is a clear, colourless liquid with a characteristic agreeable odour. In dilute aqueous solution it has a somewhat sweet flavour, but in more concentrated solutions it has a burning taste. In India research and development efforts for using ethanol blended transport fuels started in 1980 (Linoj and Maithel, 2006). Nowadays, fermentation technology produces nearly 80 per cent ethanol as clean fuel and for which *Saccharomyces cerevisiae* is considered to be of most important yeast strain because of its biotechnological application in the field of fermentation technology (Sheoran and Jeffries, 1996). Ethanol produced by fermentation has been found to serve considerably as transportation fuel for cars, trucks and trains. In India, fuel

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