Improvement of the Bioethanol Production from Banana (*Kathali* Variety) Fruit Juice using Baker's Yeast

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The objective of the study was to optimize bioethanol production from banana (*Kathali* variety) fruit juice using baker's yeast in order to increase the yield. The banana juice was inoculated with *Saccharomyces cerevisiae* (baker's yeast- 2 g/L) in the fermentation media composed of 10 g/L yeast extract, 10 g/L KH_2PO_4, 2 g/L $(NH_4)_2SO_4$, 2g/L peptone and 0.5 g/L $MgSO_4 \cdot 7H_2O$ and allowed for fermentation for 24 h at room temperature. When the initial conditions used for the fermentation were 5 g/L of yeast inoculum, room temperature (30 ^oC), shaking speed of 100 rpm for 24 h, the amount of ethanol produced from the banana juice was 0.8% (v/v). The conditions were optimized sequentially by changing one factor at a time while keeping the other variables constant and the condition optimized from each experiment was used in the following experiment. When different nitrogen sources such as urea, ammonium sulphate, ammonium carbonate and ammonium nitrate were used in the fermentation media, highest ethanol production (1.13 times than no nitrogen source) was obtained in the medium containing ammonium carbonate as nitrogen source. When the amount of initial yeast inoculum was used as 5 g/L, ethanol yield increased by 1.11 times than the control which contained the amount of initial yeast inoculum 2 g/L. When the fermentation temperature was used as 25 °C, ethanol production significantly increased by 1.2 times than the control. When the rotation speed of the media was used as 150 rpm, ethanol yield increased by 1.08 times than the non-optimized conditions (100rpm). After the optimization of fermentation time (24 h), inoculum size (0.5 g/100mL), temperature (25 ^oC) and rotation speed (150 rpm), the production of bioethanol was significantly (p<0.05) increased in *Kathali* variety of banana juice (1.63 times) than under the non-optimized conditions.

Keywords: Ammonium carbonate, baker's yeast, banana fruit, bioethanol, fermentation