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OPTIMIZATION OF CONDITIONS FOR THE BIOETHANOL PRODUCTION FROM BANANA (KATHALI VARIETY) FRUIT JUICE USING BAKER'S YEAST

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Increase in the world population and industrialization have led us to continuously thrive towards exploring new natural fuel sources to meet the demands of high energy production. This study was aimed to determine the bioethanol production from the banana fruit juice and to optimize the culture conditions and fermentation media to increase the yield. When basal medium containing 10 g/L yeast extract, 10 g/L KH₂PO₄, 2 g/L (NH₄)₂CO₃, 2g/L Peptone, 0.5 g/L MgSO₄·7H₂O was taken in rotatory shaker and inoculated with *Saccharomyces cerevisiae* (0.5g/L) and allowed to ferment at 25°C at 150rpm for 24 hours, the ethanol production was 1.30%. The conditions were optimized sequentially by changing one factor at a time while keeping the other variables constant and the optimized of each experiment was used in the following experiment. When different concentrations of the banana juice (5, 10, 25, 50 and 90%) were used, the ethanol yield was significantly increased by 3.15 times (alcohol yield 4.10%) with 90% of banana juice, than the control 25%. When the amount of ammonium carbonate was optimized as 0.1g/100ml, ethanol yield was increased by 1.07 times (alcohol yield 4.40%) than the control of 0.2g/100ml. When different carbon sources such as glucose, maltose, sucrose & dextrose (2g/100ml) were used in the fermentation media, highest ethanol production (1.1 times, 4.80%) was obtained in the medium containing sucrose. When the amount of the sucrose was optimized as 15g/100ml, ethanol yield was significantly increased by 2.33 times than the control (2g/100ml). When the pH of the medium was changed from 4.0 – 9.0, significantly higher ethanol yield (12.6%) was obtained when the pH was kept at 6.0, than the control pH 7.0. Since there was no significant change in the alcohol yield observed between the different incubation periods of the media (24h, 48h, 72hr & 96h), it was decided to use 24h as the incubation period. After the optimization of all these culture conditions, the quantity of bioethanol production was significantly increased by 15.75 times (12.6%) than the non-optimized conditions. Large scale fermentation study needs to be done in order to confirm the above finding.

Key words: Baker's yeast, bioethanol, banana fruit juice, fermentation, incubation period

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