

Optimization of Fermentation Medium for Bioethanol Production from Palmyrah Molasses

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Molasses is the waste material obtained from the production of palmyrah sugar candy and it could be used for alcohol production through fermentation process thereby it reduces the production cost of sugar candy. The aims of the study were to select the best yeast species and optimize the fermentation conditions to produce ethanol. The best yeast strain for fermentation was selected according to their alcohol tolerance and growth on molasses using the cell density count in spectrophotometer. Molasses was tested for the chemical parameters such as brix, total sugar, reducing sugar, pH, total acidity and alcohol before using it as fermentation medium. Optimization of fermentation was carried out with different initial brix (5, 10, 20, 30, 40 °Brix), inoculum size (1, 2, 3, 4 ml), pH (4, 4.5, 5, 5.5, 6, 6.5) and temperature (30, 35, 45, 55 °C). Each treatment was triplicated under controlled environment conditions. Results indicated that the absorbance 0.508 and 0.788 were obtained as highest cell density for high alcohol (8.5%) tolerance and growth on molasses, respectively. The best yeast strain was used for further fermentation studies and recorded the initial brix, pH, total sugar and reducing sugar values as 58.73 °Brix 4.5, 62.39 and 8.06%, respectively while the alcohol content given nil. Brix 10° and inoculum size of 3 ml were selected as the optimum at 3rd and 6th day of fermentation with mean value of 2.6 and 4.4 alcohol percentages among the different treatments. Optimum pH for the process was recorded as 4.5 and it gave the highest 4.6 alcohol percentage on 5th day while optimum temperature was 35 °C and resulted 4.8 alcohol percentages on 4th day. There was a significant decrease in total solids of all the treatments during the fermentation process. Bioethanol production from palmyrah molasses could be enhanced up to 72% by the optimization of fermentation condition (Brix, Inoculum size, pH, Temperature) using the selected yeast strain.

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