A COMPARATIVE STUDY OF MOLASSES FERMENTATION BY YEAST AT DIFFERENT SUGAR, ETHANOL AND pH LEVELS

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Sugar cane molasses is fermented to ethanol at a total sugar concentration of 12.5% and pH 4.8 in Sri Lanka. A comparison of bakers yeast, Champagne yeast, Sautern wine yeast and two cultures of yeasts isolated from fermenting Kitul (Caryota urens) treacle were done at total sugar concentrations of 7.5 to 17.5%, pH 3.5 to 6.5 and varying ethanol concentrations of 20 to 70 g L^{-1}. Reduction in weight due to loss of carbon dioxide in 100 ml molasses solutions placed in 250 ml conical flasks were estimated twice daily. The results were used to obtain kinetic plots for rate of ethanol production at different ethanol concentrations.

Of the yeasts tested bakers yeast showed the highest rate of fermentation followed by Sauterns and Champagne yeasts. The rate of decrease of rate of fermentation with increasing ethanol concentration was least in bakers yeast. All yeasts were inactivated by acetic acid below pH 5.5 and by sulphuric acid below pH 3.5. At initial sugar concentration of 12.5% and varying pH values the highest fermentation rate of 305 mg ethanol L^{-1} h^{-1} was observed at pH 4.5 to 5.0 with sulphuric acid. At sugar concentration of 17.5% and pH 4.8 and 50 g L^{-1} ethanol concentration the rates exhibited by bakers yeast, Sautern yeast and wine yeast were 336, 297 and 297 mg ethanol L^{-1} h^{-1} respectively. This is more than 50% increase of rate of fermentation compared with the values at 12.5% sugar practiced in the industry. High rates of fermentation by yeasts is an important criterion in continuous alcoholic fermentation carried out at a constant level of ethanol. Fermenting molasses at 17.5% sugar and at an ethanol level of 50mg L^{-1} will provided the benefit of quick fermentation.