

Baker's Yeast Cell Mass Production by Utilizing Locally Available Carbon and Nitrogen Sources

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This research work was carried out in order to analyze the possibility of increasing the baker's yeast (*S. cerevisiae*) production by the efficient utilization of locally available carbon and nitrogen sources. In accordance to this, rice starch and soya protein were selected as the carbon and nitrogen sources respectively. Basically, *S. cerevisiae* was grown at 30 °C and pH 5.0, in a fermentation medium containing rice flour hydrolysate equivalent to 50gL⁻¹ of reducing sugars, yeast extract (2.5gL⁻¹), bacteriological peptone (1.15gL⁻¹), (NH₄)₂HPO₄ (0.25gL⁻¹) and MgSO₄.7H₂O (0.025gL⁻¹) in a 2L flask with the aid of aeration (200bubbles/min). Rice flour hydrolysate was obtained from the enzymatic hydrolysis. Rice flour (500gL⁻¹) was hydrolysed with α-amylase (1.56KNUmL⁻¹) at pH 7.0 and 95°C for 1 hour and after cooling at pH 4.5 with glucoamylase (0.4 AGUml⁻¹) for 3 hours at 60 °C. Highest DE obtained was 85.8%. Maximum cell mass of (dry weight) 5.72gL⁻¹ was obtained from the rice flour hydrolysate medium. In the analysis of the nitrogen sources, the concentration of yeast extract in the basic fermentation medium was changed from, 2.5, 5.0, 7.5 to 10.0gL⁻¹, in which 10.0gL⁻¹ concentration gave the highest cell mass of 7.5gL⁻¹, and was selected as the optimum concentration for further studies. The variation in the bacteriological peptone concentration in the basic medium from, 0.575, 1.15, 2.3, 3.45 to 4.6gL⁻¹ resulted in the highest yeast cell mass production of 6.12gL⁻¹ in the concentration of 3.45gL⁻¹. Different concentrations of Neutrase (2.5, 5.0, 7.5 and 10.0mLL⁻¹) were added to the rice flour hydrolysate with the aim of hydrolyzing the rice protein. The highest cell mass obtained was 7.21gL⁻¹ in 10.0mLL⁻¹ Neutrase added medium. The next attempt was to substitute the nitrogen sources with soya meat and soya bean, which were refluxed in the presence of 0.2N HCl. The soya protein, in the form of amino acids, equivalent to the optimum concentration of the fermentation medium (320mgL⁻¹) was introduced to the rice flour hydrolysate medium. By refluxing soy meat and soy bean flour suspensions with acid under pressure, the free amino acid contents increased to 1.07 and 1.26mgmL⁻¹ respectively. The highest cell mass obtained for the soya meat and soya bean supplemented media were 6.50 and 6.38gL⁻¹ respectively, where as, the control recorded a cell mass yield of 7.02gL⁻¹. Further studies will be conducted to involve the baker's yeast produced by utilizing optimized conditions in a larger scale for the use in bread making.