

## Production of Single Cell Protein from Papaw Fruit Juice using Palmyrah Toddy Mix

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### ABSTRACT

Presently, worldwide protein shortage has become an important issue with an increasing rate of population growth. In this study, Liquid State Fermentation (LSF) was carried out to produce Single Cell Protein (SCP) from papaw (*Carica papaya*) fruit juice using toddy (an alcoholic beverage created from natural yeast fermentation of palmyrah inflorescence sap) as mixed culture. The LSF experiments were performed in a shaking incubator (100 rpm speed, 30 °C temperature) with the fermentation media composed of glucose (10 g/L), MgSO<sub>4</sub> (0.5 g/L), NaCl (0.1 g/L), CaCl<sub>2</sub> (0.1 g/L) and KH<sub>2</sub>PO<sub>4</sub> (1 g/L) as control. Medium inoculated with 5 mL of toddy and 100 mL/L (10%) of papaw fruit juice was used as a replacement for glucose in papaw medium. Before optimization of conditions, papaw as a sole medium after 24 hours of fermentation at 28 °C with 100 rpm in a shaking incubator yielded 35.45% crude protein. The influence parameters such as fermentation time, temperature and different concentrations of carbon and nitrogen sources on SCP production were determined. After the optimization, it was concluded that at 30 °C for 72 hours of fermentation with the 5% (50 mL/L) of papaw fruit juice as a carbon source yielded 40% crude protein without any inorganic nutrient supplements in the medium. When papaw medium was supplemented with inorganic nutrient supplements (KH<sub>2</sub>PO<sub>4</sub>, MgSO<sub>4</sub>.7H<sub>2</sub>O, CaCl<sub>2</sub> and NaCl) except nitrogen source, the crude protein content was significantly increased to 43.12% from 40% ( $p < 0.05$ ). After the reduction of nucleic acid content of SCP by using 1N NaOH, crude protein yield was increased further by 0.93% (44.05%). When medium was supplemented with nitrogen sources such as soybean flour, groundnut flour, corn flour, ammonium sulphate and peptone, there was no significant increase in the amount of crude protein compared to media without nitrogen source. Therefore it is concluded that, SCP could be produced from papaw fruit juice using natural toddy mixed culture, under optimized culture condition. Large scale studies and analysis need to be performed in order to proceed this finding for the commercial application.

**Keywords:** Liquid state fermentation, papaw fruit juice, single cell protein, toddy mix