

Papaw fruit juice as source for single cell protein production using natural palmyrah toddy yeast

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Abstract

The study was carried out to perform Liquid State Fermentation (LSF) to produce Single Cell Protein (SCP) from papaw (*Carica papaya*) fruit juice using natural yeast obtained from Palmyrah (*Borassus flabellifer*) toddy. The LSF was performed in a shaking incubator (100 rpm) with the control fermentation medium (glucose) inoculated with 5 mL toddy. The glucose and $(\text{NH}_4)_2\text{SO}_4$ of the control medium were replaced with 100 ml/L of papaw fruit juice. The fermentation time, temperature and different concentrations of carbon and nitrogen sources on the SCP production were determined. After optimizing the conditions, the fermentation was carried out for 72 hours at 30°C with 5% of papaw fruit juice, and this has significantly increased the SCP yield to 40 % crude protein from 35.5 % (1.13 times). When the papaw juice was supplemented with inorganic nutrient supplements (KH_2PO_4 , $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, CaCl_2 and NaCl), the crude protein content was significantly ($p < 0.05$) increased to 43.1 % from 40 % (1.08 times). After the reduction of nucleic acid using 1N NaOH, the crude protein yield increased further by 1 % (from 43.1 % to 44.1 %). When the medium was supplemented with nitrogen sources such as soybean flour, groundnut flour, corn flour, ammonium sulphate and peptone, no significant changes were determined. The amino acid analysis of the crude protein indicated that the product contained all the essential amino acids. Vitamin B analysis of SCP revealed that the crude protein contained thiamin (0.81 mg/100g) and riboflavin (2.3 mg/100g). Therefore, the production of crude protein from papaw fruit juice with natural toddy yeast culture could be used as a more economical method of producing SCP efficiently. This method can be further expanded in order to apply in industries.

Keywords: Liquid state fermentation (LSF) , papaw fruit juice , single cell protein (SCP) , palmyrah toddy , yeast