Production of phytase by Mitsuokella jalaludinii in semi-solid state fermentation of agricultural by-products

ABSTRACT

Phytase activity and growth of anaerobic rumen bacterium, Mitsuokella jalaludinii were investigated by semi-solid state fermentation. Carbon source (rice bran, yam and cassava), nitrogen sources (soya bean, offal meal, fish meal and feather meal) and growth factors (hemin, L-cysteine hydrochloride and minerals) were evaluated in a one-factor-at-a-time approach. Rice bran and fish meal produced better growth and phytase enzyme activity. The removal of L-cysteine hydrochloride and minerals significantly decreased ($p<0.05$) phytase activity from 1178.72 U to 446.99 U and 902.54 U, respectively. The response surface methods (RSM) was conducted to optimize the phytase production and the results showed the combination of 7.7% of rice bran and 3.7% of fish meal in semi-solid state fermentation gave the highest phytase activity. Maximum phytase production and optimum growth of bacteria were detected at 12 h incubation in both MF medium (control) and agro-medium. In this agro-medium, M. jalaludinii produced 2.5 fold higher phytase activity compared to MF medium.

Keyword: Agro-medium; Mitsuokella jalaludinii; Phytase activity; Response surface methods; Semi-solid state fermentation