Effect of superficial air velocity on solidstate fermentation of palm kernel cake in a lab scale fermenter using locally isolated fungal strain

Abstract

Solid state fermentation (SSF) is emerging as an attractive alternative to submerged fermentation despite the engineering problems such as removal of metabolic heat, transport of oxygen and moisture into the particles and the heterogeneity of the substrate. In the present work, a lab scale fermenter which can be operated as fluidized bed and packed bed was fabricated. Solid state fermentation of palm kernel cake (PKC) using fungal strain TW1 was carried out at three superficial air velocities. PKC particles of mean diameter 855 μm were used and the fluidizing medium was air. Reducing sugar concentration, biomass growth, bed moisture content, substrate pH, and hemicellulose content were measured. The maximum increase in reducing sugar concentration was at 0.17 m/s since an increase in mannose from 14.55 to 18.63 mg mannose/g dry PKC was observed. The hemicellulose content of this fermented PKC was estimated and the result was around 10% in reduction of hemicellulose content in fermented PKC. Further improvement of PKC bioconversion can likely be achieved by selection of a more robust microbe that can withstand the conditions in the fluidized bed during SSF and by creating a system which can maintain the moisture content of PKC during SSF of PKC throughout the packed bed.