Optimization of multi-enzyme production by fungi isolated from palm kernel expeller using response surface methodology

ABSTRACT

Response surface methodology (RSM) was used to optimize the co-production of a mixture of crude cellulosic and hemicellulosic enzymes (endoglucanase, xylanase, and mannanase) by Aspergillus terreus K1 in solid-state fermentation (SSF) using palm kernel expeller (PKE) as the sole carbon source. These enzymes have gained renewed interest due to their efficacy to improve the digestibility of PKE for use in diets of mono-gastric animals (poultry, pigs, and fish). The results showed that temperature, moisture, inoculum concentration, and initial pH had significant ($P < 0.05$) effects on the enzymes production. Using PKE as a solid substrate, maximum endoglucanase, mannanase, and xylanase (17.37, 41.24, and 265.57 U/g DM, respectively) were obtained at 30.5 °C, 62.7% moisture, 6% inoculum, and pH 5.8. The enzyme activities recorded were close to the predicted values (19.97, 44.12, and 262.01 U/g DM, respectively).