Lipase production and growth modeling of a novel thermophilic bacterium : aneurinibacillus thermoaerophilus strain AFNA.

ABSTRACT

Aneurinibacillus thermoaerophilus strain AFNA as a novel isolated extracellular thermostable organic solvent tolerant lipase producing bacterium was employed in the present study. The lipase production of strain AFNA and its correlation with bacterial growth was studied via a modeling assessment by response surface methodology (RSM) and artificial neural network (ANN) techniques. The best achieved models were multilayer full feed forward incremental back propagation network and modified cubic response surface model (mRSM) using backward elimination. The highest lipase specific activity (13.1 Umg-1) and bacterial growth (OD600 = 3.0) were obtained at technically similar: growth temperature (53 and 53ºC), inoculum size (2.6 and 3.0%), agitation rate (118 and 115 rpm) and initial pH (7.0 and 7.2) but different medium volume (139 and 87 ml) and incubation period (48 and 38 hrs), respectively. In addition, the importance of effective parameters on the bacterial growth and lipase production was studied where pH and inoculum size were the most and the least effective factors, respectively. Significant correlation between lipase production and bacterial growth was observed when Bivariate correlation was employed to analyse the data. As a conclusion, lipase production was the result of a synergistic combination of effective parameters interactions and these parameters were in equilibrium.

Keyword: Artificial neural network; Modified response surface methodology; Thermostable; Organic solvent tolerant.