Production of a solvent, detergent and thermotolerant lipase by a newly isolated Acinetobacter sp. in submerged and solid-state fermentations

ABSTRACT

The lipase production ability of a newly isolated Acinetobacter sp. in submerged (SmF) and solid-state (SSF) fermentations was evaluated. The results demonstrated this strain as one of the rare bacterium, which is able to grow and produce lipase in SSF even more than SmF. Coconut oil cake as a cheap agroindustrial residue was employed as the solid substrate. The lipase production was optimized in both media using artificial neural network. Multilayer normal and full feed forward backpropagation networks were selected to build predictive models to optimize the culture parameters for lipase production in SmF and SSF systems, respectively. The produced models for both systems showed high predictive accuracy where the obtained conditions were close together. The produced enzyme was characterized as a thermotolerant lipase, although the organism was mesophile. The optimum temperature for the enzyme activity was 45°C where 63% of its activity remained at 70°C after 2 h. This lipase remained active after 24 h in a broad range of pH (6–11). The lipase demonstrated strong solvent and detergent tolerance potentials. Therefore, this inexpensive lipase production for such a potent and industrially valuable lipase is promising and of considerable commercial interest for biotechnological applications.

Keyword: Thermotolerant lipase; Acinetobacter sp.; Solid-state fermentations