

## Spray-dried immobilized lipase from *Geobacillus* sp. strain ARM in sago

### ABSTRACT

Sago starch is traditionally used as food especially in Southeast Asia. Generally, sago is safe for consumption, biodegradable, easily available and inexpensive. Therefore, this research was done to expand the potential of sago by using it as a support for enzyme immobilization. In this study, ARM lipase, which was isolated from *Geobacillus* sp. strain ARM, was overexpressed in *Escherichia coli* system and then purified using affinity chromatography. The specific activity of the pure enzyme was 650 U/mg, increased 7 folds from the cell lysate. The purified enzyme was immobilized in gelatinized sago and spray-dried by entrapment technique in order to enhance the enzyme operational stability for handling at high temperature and also for storage. The morphology of the gelatinized sago and immobilized enzyme was studied by scanning electron microscopy. The results showed that the spray-dried gelatinized sago was shrunken and became irregular in structure as compared to untreated sago powder. The surface areas and porosities of spray-dried gelatinized sago with and without the enzyme were analyzed using BET and BJH method and have shown an increase in surface area and decrease in pore size. The immobilized ARM lipase showed good performance at 60-80 °C, with a half-life of 4 h and in a pH range 6-9. The immobilized enzyme could be stored at 10 °C with the half-life for 9 months. Collectively, the spray-dried immobilized lipase shows promising capability for industrial uses, especially in food processing.

**Keyword:** Entrapment; Enzyme immobilization; *Geobacillus* sp.; Lipase; Sago; Spray-dry