

Rice bran lipase catalyzed esterification of palm oil fatty acid distillate and glycerol in organic solvent

ABSTRACT

Rice bran lipase (RBL) was delipidated to enhance its stability in organic solvent and its esterification activity at elevated temperature. The esterification activity of delipidated RBL increased as temperature was increased from 45 to 65°C. The esterification activity of delipidated RBL at 65°C was about 14 times greater than that of the non-delipidated RBL. As temperature was further increased to 75°C, the non-delipidated RBL lost all esterification activity, whereas the delipidated RBL retained approximately 48% of its esterification activity. The delipidated RBL maintained a relative esterification activity greater than 80% after 16 h of incubation in hexane, whereas the non-delipidated RBL maintained a relative esterification activity of only 50%. A method for production of acylglycerol using delipidated RBL to esterify palm oil fatty acid distillate (PFAD) with glycerol in hexane was successfully developed. The effects of reaction temperatures and type of water removal agents (silica gel and molecular sieve) on the degree of esterification were also examined. A 4 h reaction at 65°C, catalyzed by delipidated RBL and using silica gel as the water removal agent resulted in 53.8% esterification. Thin layer chromatography analysis suggested that the esterified product was primarily comprised of mono- and di-acylglycerols.

Keyword: Acylglycerol; Enzymatic synthesis; Esterification; Free fatty acid; Glycerol; Palm oil fatty acid; Rice bran lipase