

Extraction and Functional Properties of Protein from De-Oiled Rice Bran

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ABSTRACT

The de-oiled Sangyod Phatthalung (Oryza sativa L.) rice bran waste from screw-press, rice bran oil production contains 12.8% protein. It was used to study the optimization of protein extraction. An optimization procedure using a central composite design (CCD) with three factors –sodium hydroxide concentration (0.05-0.2 M), extraction temperature (30-60°C) and extraction time (60-240 min) – determined the effect of these parameters on extraction yield and functional properties of rice bran protein. The optimum conditions obtained by using response surface methodology (RSM) were a sodium hydroxide concentration of 0.13 M at an extraction temperature of 49°C for 170 min. The predicted protein extraction yield for these optimum conditions was 45.2%. A verification experiment was conducted under optimum conditions and the protein extraction yield was 43.1%. The experimental and predicted values were similar, confirming that the prediction model equation was capable of reasonably and accurately predicting the protein extraction yield. The rice bran protein extract exhibited a maximum solubility at pH 10 (68.3%). The foaming activity, foaming stability, emulsifying activity index (EAI) and emulsion stability index (ESI) values of the rice bran protein at pH 10 were 113.4% v/v, 62.6 min, 0.170 (Abs_{500nm}) and 37.1 min, respectively. These results indicated that protein can be extracted from de-oiled Sangyod Phatthalung rice bran with a high yield and can be used as a food ingredient or protein source.

Keywords: Extraction, Protein, Rice bran, Sangyod Phatthalung, Response surface methodology

INTRODUCTION

Thailand is a leading rice producer and exporter. Over 31 billion metric tons of rice paddy was harvested annually during the period 2010-2013, generating 11 billion metric tons of byproducts from rice milling and polishing, including broken rice, rice bran and rice hull (Rice Department, 2014). Rice bran is an