

Extraction of Rice Bran Protein Using Enzymes and Polysaccharide Precipitation

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Abstract : Rice is a staple food as well as exported commodity of Thailand. Rice bran, a 10.5% constituent of rice grain, is a by-product of rice milling process. Rice bran is normally used as a raw material for rice bran oil production or sold as feed with a low price. Therefore, this study aimed to increase value of defatted rice bran as obtained after extracting of rice bran oil. Conventionally, the protein in defatted rice bran was extracted using alkaline extraction and acid precipitation, which results in reduction of nutritious components in rice bran. Rice bran protein concentrate is suitable for those who are allergic of protein from other sources eg. milk, wheat. In addition to its hypoallergenic property, rice bran protein also contains good quantity of lysine. Thus it may act as a suitable ingredient for infant food formulations while adding variety to the restricted diets of children with food allergies. The objectives of this study were to compare properties of rice bran protein concentrate (RBPC) extracted from defatted rice bran using enzymes together with precipitation step using polysaccharides (alginate and carrageenan) to those of a control sample extracted using a conventional method. The results showed that extraction of protein from rice bran using enzymes exhibited the higher protein recovery compared to that extraction with alkaline. The extraction conditions using alcalase 2% (v/w) at 50 C, pH 9.5 gave the highest protein (2.44%) and yield (32.09%) in extracted solution compared to other enzymes. Rice bran protein concentrate powder prepared by a precipitation step using alginate (protein in solution: alginate 1:0.006) exhibited the highest protein (27.55%) and yield (6.62%). Precipitation using alginate was better than that of acid. RBPC extracted with alkaline (ALK) or enzyme alcalase (ALC), then precipitated with alginate (AL) (samples RBP-ALK-AL and RBP-ALC-AL) yielded the precipitation rate of 75% and 91.30%, respectively. Therefore, protein precipitation using alginate was then selected. Amino acid profile of control sample, and sample precipitated with alginate, as compared to casein and soy protein isolated, showed that control sample showed the highest content among all sample. Functional property study of RBP showed that the highest nitrogen solubility occurred in pH 8-10. There was no statically significant between emulsion capacity and emulsion stability of control and sample precipitated by alginate. However, control sample showed a higher of foaming and lower foam stability compared to those of sample precipitated with alginate. The finding was successful in terms of minimizing chemicals used in extraction and precipitation steps in preparation of rice bran protein concentrate. This research involves in a production of value-added product in which the double amount of protein (28%) compared to original amount (14%) contained in rice bran could be beneficial in terms of adding to food products eg. healthy drink with high protein and fiber. In addition, the basic knowledge of functional property of rice bran protein concentrate was obtained, which can be used to appropriately select the application of this value-added product from rice bran.

Keywords : alginate, carrageenan, rice bran, rice bran protein

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