Abstract

Optimal conditions for rice bran (Jasmine 105) protein hydrolysates production using a commercial enzyme, Protex 6L, were determined to obtain maximal radical scavenging activity (RSA) and yield using Response Surface Methodology (RSM). Two-step processes were performed as follows: (1) selection of important parameters with respect to RSA of protein hydrolysates using Fractional Factorial Design (FFD). Four parameters including water to rice bran protein ratio (W/R) (2-6 w/w), enzyme-substrate ratio (E/S) (1-5 w% of rice bran protein), time (t) (2-6 h), and temperature (T) (50-60°C) of hydrolysis conditions were studied while pH was fixed at 8.0. It was found that W/R was more significant than other factors $(p \leq 0.05)$. And (2) RSM was used to optimize protein hydrolysis process with two parameters of pH (x_1; 7.5-8.5) and W/R (x_2; 3-5 w/w). Other parameters were set as follows: E/S=3%, t=4 h and T=55°C. Central composite design (CCD) was chosen and three responses; RSA (Y_1), yield (Y_2) and degree of hydrolysis (Y_3) were investigated. Multiple regression analysis showed that relationships between responses and independent variables could be represented by models: $Y_1 = 26.98 - 5.44x_1^2 - 3.22x_2^2$ ($R^2 = 0.8155$); $Y_2 = 30.48 - 2.14 \ x_1^2 - 0.80x_2^2$ ($R^2 = 0.8952$); and $Y_3 = 17.35 - 0.42x_2 - 0.83x_1^2 - 0.94x_2^2$ ($R^2 = 0.8970$). The Optimum condition for rice bran protein hydrolysis in order to maximize the RSA is at pH = 7.94 and W/R = 3.93. At this condition, RSA of 27.08%, yield of 30.45% and DH of 17.36% were obtained. Four hydrolysis conditions were performed to validate the model. It was found that true values and predicted values were not significantly different (p>0.05).