ABSTRACT

The ability to understand the functional aspects/properties of food can help to improve the use of orange-fleshed sweet potato flour (OFSP) into various food products. This study was carried out to investigate the effect of extrusion cooking parameters (die temperature, screw speed and feed moisture content) on physical (functional) properties of extruded ready-to-eat (RTE) foods from orange-fleshed sweet potato flour using response surface methodology (RSM). Box-Behnken experiment under Design Expert software was used and 17 randomized experimental runs with 5 centre points were generated. In order to ensure the quality of extruded ready-to-eat foods, lateral expansion, bulk density, water hydration capacity, water absorption index, oil absorption capacity, water solubility index, and swelling capacity were analyzed. Co-rotating twin screw extruder was set at constant barrel temperature of 65 ± 5oC for three heating zones. Extrusion cooking variables were at three levels for die temperature (70, 80 and 90oC), screw speed (350, 375 and 400 rpm), and the feed moisture content (30, 35 and 40%). Multiple regression and Analysis of Variance (ANOVA) at 5% significance level were carried out. The results showed that independent variables had significant effect ($p<0.05$) on functional properties of RTE foods. The lateral expansion of extruded ready-to-eat food ranged from 85 - 125%, bulk density (0.13 - 0.50 g/cm3), water hydration capacity (4.2 - 6.17 g/g), oil absorption capacity (0.85 - 1.18 g/g), water absorption index (2.6 - 4.9 g/g), water solubility index (3.6-12%) and swelling capacity (2.4 - 6.2 ml/g). The numerical optimization generated the optimum extrusion process conditions of 90oC, 400 rpm and 35% for die temperature, screw speed and feed moisture content, respectively. The predicted values were 125%, 0.13 g/cm3, 6.22 g/g, 1.18 g/g, 2.99 g/g, 11.51%, and 5.05 ml/g for lateral expansion, bulk density, water hydration capacity, oil absorption capacity, water absorption index, water solubility index and swelling capacity, respectively with the overall desirability (coefficient of determination) of 0.930. The optimum conditions and the generated models can be used for food processors and academic communities to predict the quality of extruded ready-to-eat foods from OFSP