

Nirandorn Chanlat 2012: Optimization of Expanded Snack Production from Pre-Germinated Brown Rice Flour Mixed with Herbs. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Mr. Sirichai Songsermpong, Ph.D. 171 pages.

Value addition of Thai rice by production of expanded snack from pre-germinated brown rice (PGBR) mixed with herbs has not been studied. The aim of this research was to study optimal conditions for production of PGBR from KDML 105 (low amylose rice) and RD 10 (waxy rice) and to produce expanded snack by twin-screw extruder. Central composite design (CCD) and Response surface methodology (RSM) was used to optimize the process. In a laboratory scale, PGBR were produced by soaking in water to study the effect of temperature (17.9-30 °C) and time (19-53 h) on the chemical compositions and pasting properties of PGBR. The result showed that, crude protein, crude fat, ash, reducing sugar and gamma-aminobutyric acid (GABA) contents were higher than brown rice (control) in both varieties, GABA content of PGBR-KDML 105 and PGBR-RD 10 was 18.58 and 40.61 mg/100 g db, respectively, pasting properties of both PGBR decreased significantly when compared with control. In addition, PGBR was produced from a pilot scale tank at 25 °C for 48 h, the results showed that crude protein, crude fat and crude fiber did not show significant difference ($P > 0.05$) reducing sugar and GABA contents increased ($P \leq 0.01$) in PGBR-KDML 105, crude protein and ash did not show significant difference ($P > 0.05$) crude fat decreased and crude fiber increased ($P \leq 0.05$) reducing sugar and GABA contents increased ($P \leq 0.01$) in PGBR-RD 10 and GABA content in PGBR-KDML 105 and PGBR-RD 10 was 17.53 and 122.51 mg/100 g db higher than control 7.1 and 60 times, respectively. Then, PGBR from the pilot scale tank was used to produce direct expanded snack with 3 factors, feed moisture (15.6 - 22.3 %) screw speed (264 - 343 rpm) and PGBR-RD 10 ratio (0 - 63.6 %). The results showed feed moisture and PGBR-RD 10 ratio had affected on physical (expansion, density, WAI and WSI) and textural properties (hardness, brittleness and toughness) and GABA content. Feed moisture and screw speed did not affected on GABA content ($P > 0.05$). Overlaid plot for optimal condition of expanded snack was feed moisture between 15- 18%, screw speed between 360- 434 rpm and PGBR-RD 10 ratio between 49-57%. Reproduction for verification of the model, the result showed no significance in predictive and experimental value ($P > 0.01$). GABA in expanded snack was 59.78 mg/100 g db. The last objective was to study the effect of cinnamon and turmeric powder (0.2 0.4 and 0.6 %w/w). The result showed that expanded snack with cinnamon and turmeric powder did not affected on physical properties ($P > 0.05$) but affected on hardness, color properties and sensory scores of expanded snack ($P \leq 0.05$). Therefore, expanded snack from PGBR mixed with herb is a functional food with high GABA, which benefit to brain health. This snack is the alternative choice for consumer and this knowledge can be used in the food industry.

Student's signature

Thesis Advisor's signature